JULY 1959

Over 60,000 copies of this issue

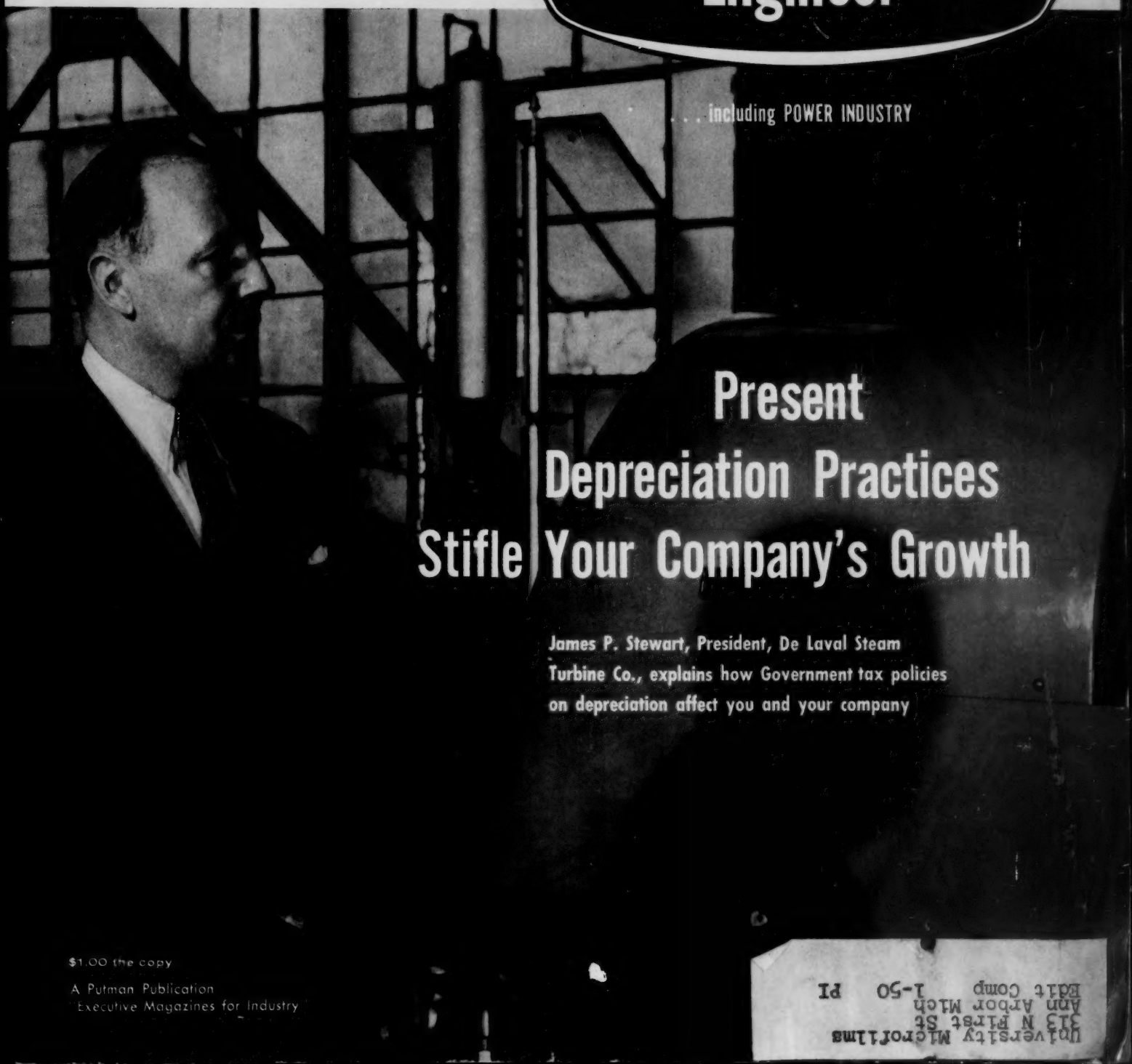
In this issue—over 110 reports of

- **technical developments**
- **new solutions**
- **new literature**

for effective plant and power services

Plant and Power Services Engineer

. . . including POWER INDUSTRY



Present Depreciation Practices Stifle Your Company's Growth

James P. Stewart, President, De Laval Steam Turbine Co., explains how Government tax policies on depreciation affect you and your company

$1.00 the copy

A Putman Publication
Executive Magazines for Industry

University Microfilms
313 N First St
Ann Arbor Mich
Edit Comp 1-50 PI

No. 1 choice for power stations... Crane Pressure-Seal bonnet gate valves

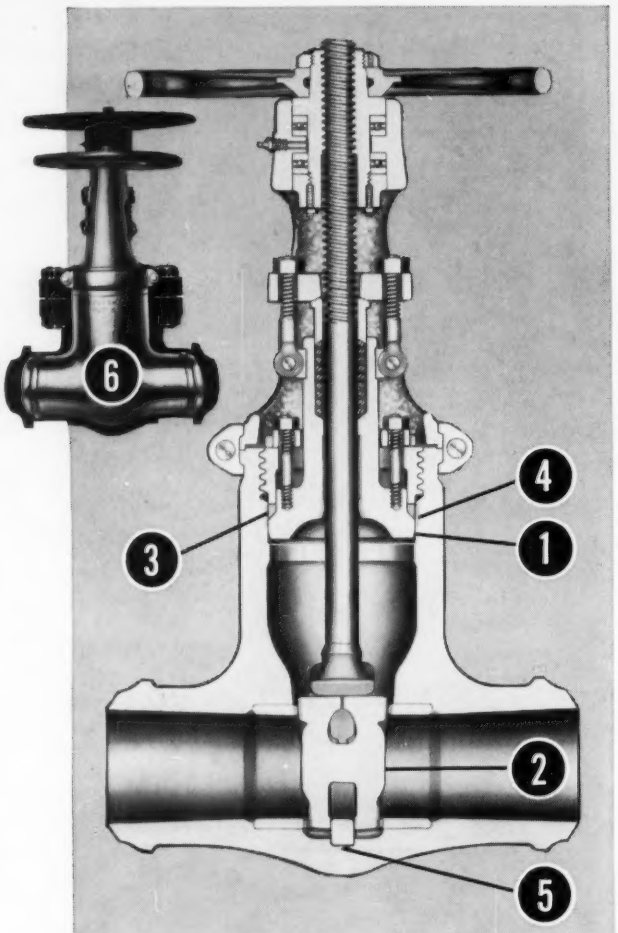
What makes a high-pressure/temperature valve long-lived, safe, dependable and economical to install and maintain?

In Crane Pressure-Seal bonnet gate valves it is:

1. **using internal pressure to seal the bonnet joint —the higher the pressure, the tighter the seal —eliminates bonnet-joint maintenance**
2. **a flexible wedge disc that prevents sticking when valve is closed hot and opened cold . . . doesn't jam even when seated with excessive torque**
3. **a one-piece, silver-plated seal ring held snugly in place by a chrome-plated retaining ring which is screwed into the body; ring remains freeze-free for easy dismantling**
4. **a wear-resisting stainless steel inlay in the body adjacent to the seal ring that insures tight sealing and maximum protection against corrosion at this important point**
5. **full-travel disc guiding—even at critical point of final closure; prevents wear and drag on seating surface**
6. **streamlined, weight-saving design—saves up to 60% of weight of conventional bolted bonnet valves . . . reduces suspension cost . . . simplifies insulating**

Crane 1500-pound Pressure-Seal bonnet globe and angle valves: 1" to 16"; socket- and butt-welding ends.

Crane's complete, expanded line of Pressure-Seal bonnet valves includes gates, globes, angles, globe lift-checks and stop-checks—in all standard sizes, ends and pressure classes. For complete information, see your Crane Representative.



Sizes 1" to 24"; 600-, 900-, 1500- and 2500-pound classes; flanged, socket- and butt-welding ends.

ALL CRANE PRESSURE-SEAL BONNET VALVES ARE ASA RATED

Minimum metal thicknesses comply fully with the requirements of ASA B16.5-1957, as well as ASA Code for Pressure Piping and ASME Boiler and Pressure Vessel Code.

CRANE® VALVES & FITTINGS

PIPE • PLUMBING • HEATING • AIR CONDITIONING

Since 1855—Crane Co., General Offices: Chicago 5, Ill.—Branches and Wholesalers Serving All Areas

Circle 9140 inside back cover.

THAT'S INTERESTING

Bright atom

Bulbs powered by radioactivity may be ready for the commercial market before long. An atomic lamp — powered entirely by radioactivity and expected to shine many years without attention or renewal of the atomic power source — has been developed by a British firm.

These experimental atomic lamps have an output of 0.0045 lumens, which represent an efficiency of just over 30 lumens per watt. While they are not bright enough to be used for illumination, they are suitable as indicator lamps.

Lamps with a lens diameter of three inches have been made which are visible in the dark at about a quarter of a mile. If the present brightness could be increased by a factor of ten, a considerable range of applications could be found.

The lamps could be used as warning lights on obstructions, for markers on buoys or for short-range signaling on life-rafts.

Garbage to steam —

The Chicago and North Western Railway and Van der Molen Disposal Company have a unique arrangement whereby the scavenger service can dispose of garbage from 80,000 suburban families and provide the railroad with steam for its Proviso freight yard diesel shop.

A modern incinerator plant with a daily capacity of 400 tons, was built by Van der Molen and combined with the North Western's steam generating plant in Melrose Park, Illinois.

The result is a most modern and efficient means of refuse disposal for the suburbs; a better method and permanent location for the scavenger company's garbage disposal; and steam as a by-product for use by the railroad in shops and other buildings.

Aug. 9-12: ASME-AICE Heat Transfer Conference; University of Connecticut, Storrs, Conn.

Aug. 18-21: Western Electronic Show and Convention; Cow Palace, San Francisco, Calif.

Sept. 7-11: Annual National Conference of Illuminating Engineering Society; Fairmont and Mark Hopkins Hotel, San Francisco, Calif.

Sept. 20-25: 14th Annual Conference and Exhibit of the Instrument Society of America; Chicago, Ill.

Sept. 27-30: 1959 National Power Conference; Hotel Muehlebach, Kansas City, Mo.

Sept. 28-Oct. 1: American Welding Society, Fall Meeting; Sheraton-Cadillac Hotel, Detroit, Mich.

Oct. 6-9: Stanford Research Institute International Symposium; Asilomar, Monterey Peninsula, Calif.

Oct. 7-9: ASME-AIME Solid Fuels Conference; Cincinnati, Ohio

Oct. 12-14: 1959 National Electronics Conference; Hotel Sherman, Chicago, Ill.

Oct. 22-23: 15th Annual National Conference on Industrial Hydraulics; Hotel Sherman, Chicago, Ill.

Oct. 29-30: 1959 Electronic Devices Meeting; Shoreham Hotel, Washington, D.C.

Nov. 2-5: 11th Exposition of Air-Conditioning and Refrigeration Industry; Convention Hall, Atlantic City, N.J.

Nov. 9-13: National Electrical Manufacturers Association Annual Meeting; Traymore Hotel, Atlantic City, N.J.

Nov. 16-20: Fifth International Automation Congress and Exposition; New York Trade Show Building, New York, N.Y.

Nov. 23-24: Instrument Society of America Symposium; Ben Franklin Hotel, Philadelphia, Pennsylvania.

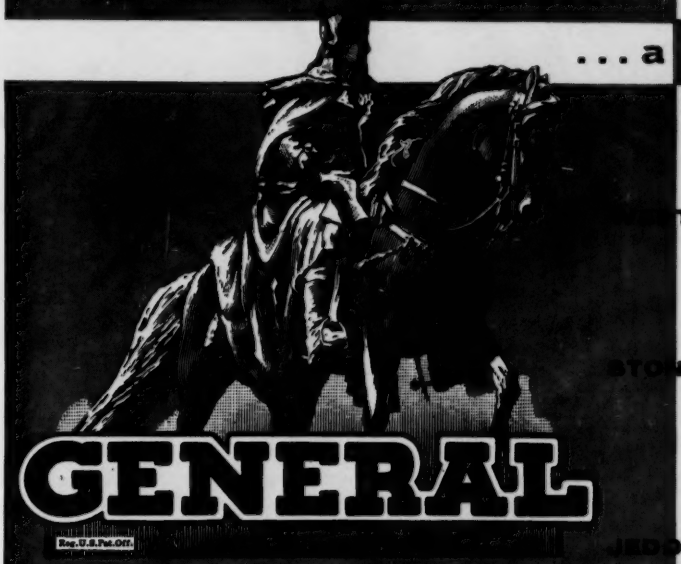
Nov. 29-Dec. 4: ASME Annual Meeting; Chalfonte Haddon Hall, Atlantic City, N.J.

Nov. 30-Dec. 4: Exposition of Chemical Industries; New York Coliseum, New York, N.Y.

Dec. 1-4: National Warm Air Heating and Air Conditioning Committee Meetings and Annual Convention; Chase Hotel, St. Louis, Mo.

GENERAL

... a trusted name in coal



GENERAL

Reg. U.S. Pat. Off.

General Coal Company

123 SOUTH BROAD STREET, PHILADELPHIA 9, PA.

Buffalo · Charlotte, N.C. · Cincinnati · Cleveland

For many decades, General Coal and its Associated Companies have successfully met the varied needs of all types of coal consumers. You can rely on this experience for all your coal requirements.

TMORELAND COAL COMPANY

HAMPTON COAL

STONEGA COKE & COAL COMPANY

GLENBROOK · STONEGA · RODA

DENDRON · CROSSBROOK

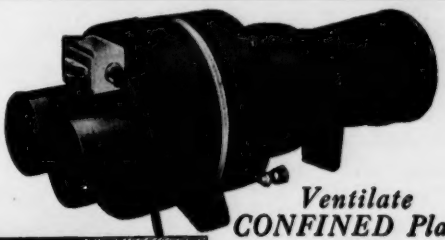
JEDDO-HIGHLAND COAL COMPANY

Hazle Brook Premium Anthracite

GENCO ANTHRACITE & BITUMINOUS COALS

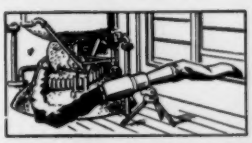
New York Norfolk

Circle 9141 inside back cover.



Ventilate CONFINED Places with Vano Design "C" Ventilator-Exhauster

WELDING FUMES are here removed by this Vano Ventilator-Exhauster.



FUMES FROM A REACTOR KETTLE are here withdrawn by tripod-mounted Vano Ventilator-Exhauster. Note non-collapsible suction tubing and discharge tubing.

Ideal for withdrawing welding fumes from confined places or directly from the welding rod. Provides greater safety, greater comfort for workers . . . leads to greater work efficiency. Can be furnished with 8" suction inlet to which 8" non-collapsible suction tubing may be attached . . . or provided with multiple inlet nozzles for 5", 4" and 3" suction hose.

Other types are also available for supplying fresh air to men working in confined places, such as tanks, manholes, drums, boilers and shipholds.

For full details on Coppus Vano Design "C" Ventilator-Exhauster write COPPUS ENGINEERING CORPORATION, 187 Park Ave. Worcester 2, Mass.

ANOTHER COPPUS "BLUE RIBBON" PRODUCT

Circle 9142 inside back cover.

COMPRESSED AIR SEPARATOR · FILTER · TRAP

MURPHY TRIUMPH AA

Installed near point of use, it separates and ejects moisture automatically, then filters out all scale, rust or other impurities and delivers air clean and dry; of instrument quality.

Write now for FREE Data Sheet No. 2567.

JAMCO

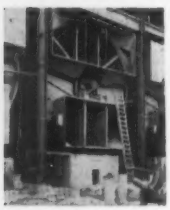
JAS. A. MURPHY & CO., INC.

1419 EAST HIGH STREET, HAMILTON, OHIO

Circle 9143 inside back cover.

Specifically speaking about this issue

We are proud of the honor bestowed upon us by the National Safety Council. The honor came in the form of a plaque which was given in recognition of this magazine's editorial contributions to safety in 1958. As safety is an important part of plant and power services, we will always bring you the "safety story" throughout every issue.



FIRE PROTECTION

Here, in this specific issue, our lead-off story deals with a system that warns of fires before they happen. A series of overheat detectors on large air heaters at Public Service Electric and Gas Company of New Jersey will sound an alarm if a hot spot should develop anywhere on the surfaces of the various air heater parts. Engineer E. N. Schwalje has told our managing editor, George Michael, a highly interesting safety story which begins on page 14.

Our cover story, this month, is just as important a subject to plant and power services people as is safety. You know that no matter how efficient or how safe a piece of equipment is your company will not be able to realize its full value if it can't write that equipment off the books at a profitable rate. As Government tax policies now stand, it is impossible to do just that. A lot has been said about this particular subject — there has been a lot of debate in Congress — but all the talk has done nothing but confuse the issue. James P. Stewart, president of De Laval Steam Turbine Company, has written a very enlightening article on the subject for P and PSE readers. You will also profit from reading about "The Million Dollar Lathe" in his article on page 16.

DEPRECIATION

Relays are another important subject to plant and power services people. They protect a multitude of operations from malfunction. Allis-Chalmers has developed protective relays having no moving parts and requiring one-third the space required by mechanical units. A detailed description of the completely static devices appears on page 19.

In last month's column, we told you that we would be giving you a story on an important development in air conditioning. Starting on page 20, this story tells how Lambert-Hudnut is using a high-temperature hot water system to run the air conditioning system. As you know, there are many advantages to using HTHW (these are outlined in the article) for heating.

AIR CONDITIONING

Now these same advantages can be applied to the operation of air conditioning systems. In this particular case, the air conditioning system provides 424 tons of refrigeration, chilling 1000 gallons per minute of water for distribution throughout the plant and office areas. Also the reasoning that went into the selection of this slightly higher-initial cost system is presented.

Next month, be sure to read about another important facet of an efficient HTHW system — that of insulation. Behr-Manning in its recently completed plant has used a unique insulation that is sure to increase efficiency.

G. W. Bauer of Mallory-Sharon Metals Corp. was asked by our editors, "What is the future of Titanium and Zirconium in plant and power services?" According to Mr. Bauer, at the present time there isn't too much application, but as work continues on these exotic metals developments will be coming along that will eliminate many of the problems to make these metals more useful. You will find his informative article on page 22.

EXOTIC METALS

W. A. Countryman

Published Monthly by
PUTMAN PUBLISHING COMPANY
PUTMAN PUBLISHING BUILDING
111 E. DELAWARE PLACE, CHICAGO 11, ILLINOIS
WHITEHALL 4-6141

Also publishers of
CHEMICAL PROCESSING,
FOOD PROCESSING,
FOOD BUSINESS

JULY, 1959
VOLUME 1 NUMBER 3
(as Plant and Power Services Engineer)

Plant and Power Services Engineer

. . . including Power Industry

© 1959, Putman Publishing Company

IN THIS ISSUE

6 Develops fluorescent lamp that fits ordinary socket
8 What happens to diesels during first 100 hours
14 Pinpoints fires before they happen — G. V. MICHAEL and E. N. SCHWALJE
16 Present depreciation practices stifle your company's growth — J. P. STEWART
19 Protective relay has no moving parts, requires 1/3 space
20 Uses HTHW for heating and COOLING —C. RODGERS
22 Future of titanium and zirconium in plant and power services — G. W. BAUER
24 Plastic 'surgery' saves diesel cooling system
25 Stands watch over combustible gases
28 Wet dust collector handles floating material effectively
30 Complete AC motor line gets 'new look'
32 How to build salt storage with better liquid level control

MONTHLY FEATURES

2 THAT'S INTERESTING
3 CONVENTIONS & EXHIBITS
6 REPORTS IN BRIEF
12 ASSOCIATION NEWS
13 LETTERS
24 NEW SOLUTIONS
28 NEW DEVELOPMENTS
38 NEW LITERATURE
41 ENGINEERING DATA
46 PHOTO NEWS

Special Service for Readers

Want more information? Circle the key number of ad or editorial on the post-paid cards opposite back cover of this issue.

SUBSCRIPTIONS

QUALIFIED READER SUBSCRIPTIONS are accepted without charge from selected executives and engineers who manage plant and power services in plants and organizations. Subscriptions are accepted from "non-qualified people" — i.e., those whose job responsibilities are not within the orbit of management as described above — at $1.00 the copy; $10.00 the year in U.S.; $35.00 outside U.S. Note: Such subscriptions are available only as an accommodation and in response to specific request. They are not counted as "industry circulation" on BPA Audit Reports. Accepted as controlled circulation publication at Mendota, Ill., 1501 W. Washington Rd.

EDITORIAL STAFF

editorial director & publisher
Russell L. Putman
editor
H. A. Countryman
managing editor
George V. Michael
west coast editor
Karl Robe
advisory editor
John W. Bishop
advisory editor
Richard F. O'Mara
art director
Ralph C. Donges
editorial assistant
Elicia Tippens
production assistant
Loretta Carlson

ADMINISTRATION

president
Russell L. Putman
vice president & treasurer
Ewing W. Graham
vice president research
George W. N. Riddle
sales manager
Richard H. Putman
production manager
Roy G. Helsing
asst. production manager
James C. Budd
director of circulation
Thomas J. Scanlon
circulation manager
Robert C. McKay

Advertising Representatives listed on page 50.

Where Severe Applications are Standard

WHIRLEX HEAVY DUTY FANS

TAKE OVER . . . Efficiently

This heavy duty WHIRLEX exhaust fan was custom designed for iron ore sintering machine. The unit is designed to carry hot gases at the rate of 200,000 CFM with 35 in. W.G. static pressure and is complete with scroll liner, cheek plate liner, blade wear pads, inlet louvre control dampers and removable section.

Additional facts and operating data on this and other WHIRLEX custom design fans are available at your request.

Fly Ash Arrestor
CORPORATION
207 North 1st. Street • Birmingham, Ala.

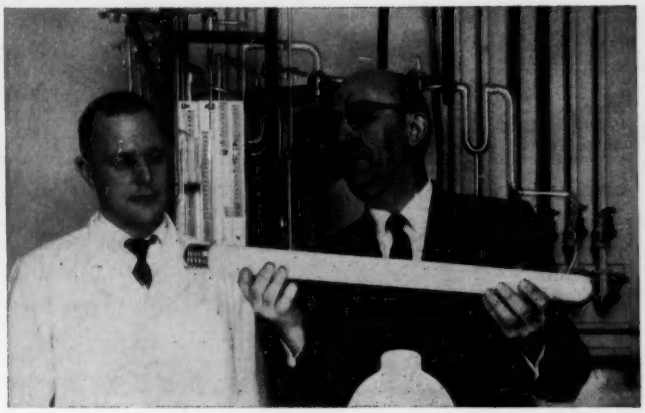
Dust Collectors • Induced Draft Fans
Forced Draft Fans • Exhaust Fans
Self Supporting Stacks • Duct Work

FLY ASH WHIRLEX ARRESTOR

Circle 9144 inside back cover.

REPORTS IN BRIEF

Develops fluorescent lamp that fits ordinary socket



Lamp uses internal tungsten filament instead of large external ballast

A fluorescent lamp which requires no external ballast or starter — and which can be burned in an ordinary light socket — has been developed by Westinghouse lamp division.

The self-ballasted fluorescent lamp contains a built-in bi-metal starting switch similar to that used in a fluorescent starter. In addition, it contains an incandescent filament which eliminates need for large external inductor ballast.

The internal incandescent filament offers additional features, too. It emits light, adding to the total lumen output of the lamp.

Secondly, the color of the light produced by the tungsten filament serves as a color-improving factor because the red end of the spectrum common to the incandescent bulb augments the normal blue-green end of the color spectrum common to the more efficient fluorescent phosphors.

The internally ballasted lamp can be made in either the conventional double-ended variety or with the socket on a single end. A threaded base could be applied so that the lamp could be screwed into a conventional incandescent bulb socket.

No plans for marketing the lamp have been reported. Westinghouse engineers are in the process of determining the scope of applications to which the lamps might be put to use.

(More information on the self-ballasted fluorescent lamp may be obtained from Westinghouse Electric Corporation, Lamp Division, Dept. P&PSE, Bloomfield, N.J.)
Circle 9145 inside back cover.

Epoxy finish is better

Nearly two years' experience in the use of an epoxy resin finish, electrostatically applied to air conditioning registers and grilles, has led officials of Lima Register Company to the opinion that it is "about twice as effective, under similar conditions of wear and corrosion, as standard type sprayed-on enamel."

Graphite textiles

A revolutionary process to convert organic textile forms directly to graphite with a purity in excess of 99.9 percent has been developed by National Carbon Company, Division of Union Carbide Corporation.

Textile forms such as yarns, braids, and belts, or fabrics that are woven or knit can be produced in this unique material.

In the complex production process, a fiber or fabric such as rayon is graphitized by electrically heating it to a temperature which approaches 5400°F.

This thermo-chemical conversion changes the crystalline structure of the material to that of graphite.

Graphite's unique combination of properties gives promise of significant applications of the new material. At ordinary pressures, graphite has no melting point. It has the unusual property of getting stronger at higher temperatures, and its tensile strength at 4500°F is about twice that at room temperature.

Graphite textiles are resistant to attack by acids, alkalies, and organic compounds, except for those of a highly oxidizing nature, and are unreactive with many molten metals. They have excellent electrical and thermal conductivity, and being in flexible form, are immune to thermal shock.

Graphite fibers and fabrics can be used to impart electrical and thermal conductivity to non-conducting materials such as plastics, ceramics and even to other textile materials such as glass cloth.

Its possible electrical uses include resistance heating elements to put heat exactly where it is wanted — and at very high temperatures.

Possible mechanical applications combine thermal properties with self-lubricity, and include valve packing and gasket materials for high-temperature seals such as those in jet engines.

Packaged boilers rating book

Book on packaged firetube boiler ratings has been published by the Packaged Firetube branch of the American Boiler & Affiliated Industries.

Boiler is described as a modified Scotch type boiler engineered, built and fire-tested before shipment, with materials, workmanship and performance guaranteed by the producing company. Components are burner, boiler controls and all auxiliary equipment.

Copy of book can be obtained by writing to the American Boiler & Affiliated Industries, Room 2502, 15 Park Row, New York 38, N.Y. Price is $1.00 a copy.

Italian atomic plant

Societa Elettronucleare Italiana (SELNI), of Milan, Italy, has signed a definitive contract with Westinghouse Electric International Company for the supply of a nuclear steam generating plant. The plant will be installed in the Italian company's Enrico Fermi atomic power project to be located in the northern part of the country.

The project, scheduled to begin operation in Spring of 1963, will have a net capacity of about 160,000 kilowatts of electrical energy.

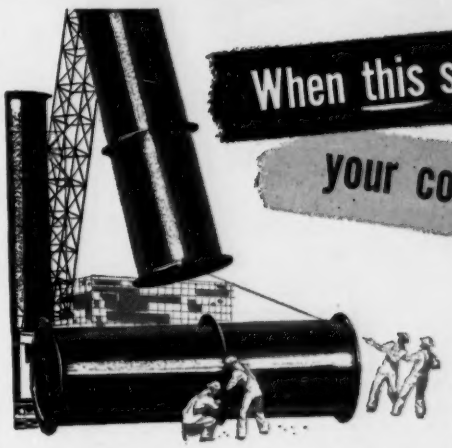
Reactor will be of the pressurized water type similar to that being built for the Yankee Atomic Electric Company. SELNI's plant, however, will include the most recent advances in design and techniques, and is expected to be the most economical in initial cost and operation of any plant of this type so far developed.

The station will normally operate as a "base load" plant, providing a regular supply of electrical energy to the power network of the Edison group, largest privately owned utility in Italy, and other utilities in Northern Italy.

Replacement Tubes

BOILER TUBE
COMPANY OF AMERICA
McKEES ROCKS, PA. (Pittsburgh District) Federal 1-7750

Circle 9146 inside back cover.



When this stack goes up
your costs go down

A. O. Smith *Permaglas*® smokestacks—glass-protected inside and out . . . are virtually impervious to condensate corrosion

Write for free bulletin SS-202 illustrating how to get greater return from your stack investment

A. O. Smith Corporation, Dept. PI-79, Milwaukee 1, Wis. Please send me a copy of the Permaglas Smokestack Bulletin No. SS-202.

Name_____ Title_____

Firm_____

Address_____

City_____ Zone_____ State_____

Through research . . . a better way

A.O.Smith

PERMAGLAS SMOKESTACK SALES
PROCESS EQUIPMENT DIVISION
MILWAUKEE 1, WISCONSIN

Circle 9147 inside back cover.

RETURN LINE CORROSION *Can* BE LICKED!

Drastic reduction of return line corrosion in an easy, effective and economical way has been the unanimous experience of hundreds of plants throughout the country using Bird-Archer's Amine Treatment.

A plant in New York State, generating approximately 500,000 lb. of steam a day, had a normal condensate pH value of 6.3 that resulted in almost constant piping replacements. Only 6 lb. per day of Bird-Archer's Amine Treatment cut maintenance costs to a new low by raising the pH value to the safe range of 8.0 to 8.5.

A plant in New England, generating 600,000 lb. of steam a day, did not have an open feedwater heater which would mechanically eliminate the exceedingly high CO_2 content of their makeup water, consequently, the pH value of their condensate was sometimes as low as 5.9. Less than 12 lb. of Amine Treatment a day raises the pH value of the condensate to 8.5, eliminates excessive corrosion.

After two years of experience with Amine Treatment a power plant in Massachusetts, making 250,000 lb. of steam a day, enthusiastically reports that they eliminate over 75% of their piping replacements through the use of only 2 or 3 lb. a day of Amine Treatment.

Return line corrosion has been licked at these plants. Let a Bird-Archer Service Engineer help you solve *your* corrosion problems.

Write for Bulletin CP100 and the name of the Bird-Archer Service Engineer nearest you.

BA-801

BIRD-ARCHER
WATER TREATING CONSULTANTS
The BIRD-ARCHER Company, 4337 N. American St., Phila. 40, Pa.
New York • Chicago
The BIRD-ARCHER Co. of California, 415 Brannan St., San Francisco
Offices in Canada and Mexico

Circle 9148 inside back cover.

The first 100 hours

What happens inside a large new diesel during the first hundred hour break-in period?

New techniques with radioactive isotopes are being used to research what goes on inside the modern, high-output diesel engine. Early high piston ring wear or excessive oil consumption can now be determined at the moment it happens.

To find answers that would effectively help evaluate engine wear and oil consumption—particularly during the break-in period—Cooper-Bessemer research engineers in conjunction with Battelle Memorial Institute have developed a radioactive tracer method of engine research.

A tracer is carried into the exhaust stream from lube oil burned in the cylinder. Simply sampling the exhaust stream indicates instantly what is occurring within the engine.

The method provides the necessary sensitivity in that it successfully measures the rate of oil consumption as a function of time and engine operating conditions.

Results of the initial tests show that:

- Rate of lube oil consumption does not change during the first 100-hour run-in period.
- Any early high piston ring wear has no apparent relation to oil consumption.
- As engine speed and load increase, oil consumption increases.
- Increasing of oil temperature and water jacket temperature decreases oil consumption.
- The existence of the top oil ring on a piston has a marked effect on maintaining low lube oil consumption.

✦ ✦ ✦

Nuclear superheat

GE has produced steam superheated by atomic power at its Vallecitos Atomic Laboratory. The pioneering experiment, called Superheat Advance Demonstration Experiment (SADE), is being conducted in an in-pile demonstration loop located in the core of the Vallecitos Boiling Water Reactor (VBWR) at the laboratory.

The project was undertaken as part of GE's "Operation Sunrise" program which proposes to attain economic nuclear power by 1970. Nuclear superheat applications are expected in target boiling water reactor plants which would operate at a cost of about six and one-half mills per kilowatt hour under this program.

The experiment uses uranium oxide ceramic fuel to superheat the steam from the boiling water reactor. First phase of the program will continue over a period of several weeks.

Initial objective of the experiment is to demonstrate the feasibility of using steam as a reactor coolant. Long range utilization of the facility for superheat fuel development is planned.

AEC contracts for Florida nuclear plant

The AEC has signed a contract with East Central Nuclear Group, Inc., and the Florida West Coast Nuclear Group for research and development work on a gas-cooled nuclear power plant of advanced design. The plant will be constructed in the Florida West Coast area.

The $26,000,000 plant will generate about 50,000 kw and will be designed as the prototype for a 200,000-kw plant. The prototype plant will use a slightly enriched uranium fuel, but the larger plant would be designed to operate on natural uranium fuel. It is expected that the prototype plant will be completed by June 30, 1963.

Got a real old GE transformer?

GE, through its distributors and district salesmen, has announced a nationwide contest in search for its oldest operating dry-type, general purpose transformer.

Its specialty transformer department, Fort Wayne, Ind., is offering to trade a brand new transformer of comparable rating with the individual or company having the oldest operating unit.

The old transformer could be rated from 30 to 100 kva and could be a single-phase or three-phase unit, or a bank of three single-phase units with a standard, general purpose voltage rating of 600 volts or below. The unit being sought must have over 20 years service and must have been in continual operation to February 1, 1959, which coincided with the announcement of GE's new line of general purpose dry-type transformers.

The new single- or three-phase units, rated from 5 through 500 kva, are available for primary voltages up to 600 volts.

The contest will close Friday, August 28, 1959. If you have an old unit that might qualify you may enter it through any of the 875 General Electric apparatus sales offices of Apparatus Distributors. (Please do not contact PLANT AND POWER SERVICES ENGINEER.)

Space age lubricants

Space ships and atomic planes of the future may be lubricated by synthetic oils and greases that function at temperatures up to 1000°F. They will also withstand five times the radiation that would destroy present lubricants.

The new materials, a family of chemicals known as meta-polyphenyl ethers, were developed by Monsanto Chemical Company scientists under contract to the United States Air Force. They represent entirely new compositions of matter, not found in nature.

Their ability to function for long periods at 800° to 900°F and take severe doses of cosmic or nuclear radiation without losing their effectiveness makes the new lubricants likely choices for future space-craft, and for immediate use in supersonic planes and missiles. Other uses of these compounds are as nuclear reactor coolants, high temperature hydraulic fluids and base oils for special greases.

In addition to their outstanding resistance to decomposition by heat and radiation, the meta-polyphenyl ethers are remarkably resistant to the damaging effects of oxygen. They are equal to present oils and greases in lubricating properties and in viscosity, or body, and can be manufactured at reasonable cost.

Out-contracting pros

With the trend more and more toward out-contracting of industrial plant services, you may be weighing the relative merits of going outside with one of your plant problems or of doing it yourself.

Here's one side of the story — a list of advantages of having the job done outside — compiled recently from a client survey by Pinkerton's National Detective Agency, Inc., which provides uniformed-guard plant protection services to more than 1400 industrial installations.

Reasons advanced by industry — not necessarily in order — include:

- Lower base cost — the contractor supplies efficient manpower at going rates in his field of operation; similar work on a company force is often done by employees transferred from other plant jobs, at unrealistic wage rates.
- Elimination of secondary costs — no fringe benefits (they're handled by the outside contractor), no vacations; no hourly rate differentials (for night, Sunday and holiday shifts).
- No absentee problem — that's the contractor's headache and he has reserves to keep posts manned in spite of sickness, etc.
- No recruitment and training problems — the force you hire consists of trained pros, under expert supervision.
- Freedom from disciplinary problems — your contractor will shift personnel at your request without creating employee-management friction.
- Freedom from added organizing and collective bargaining.
- Extra personnel readily available for temporary or emergency needs.
- Ready security clearance — when needed, the outside contractor assigns men cleared for classified production.
- Freedom from outside pressures for hiring — in the uniformed guard field this often means pressure from local police and firemen, even politicians.
- Freedom from administrative headaches — your personnel or industrial relations manager can devote all his time to his main job, instead of spending much of it on schedules, vacations, replacements, discipline and all-around supervision.

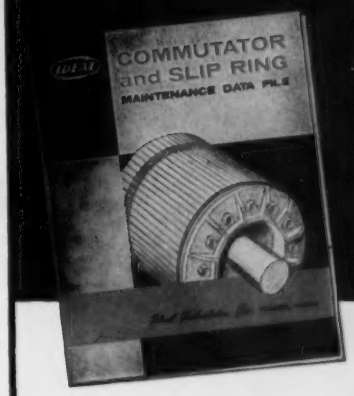
Brighter light

Lighting scientists of Sylvania Electric Products Inc. have developed a new theory in phosphor size control, which produces the brightest fluorescent lamp light output ever achieved.

By limiting the particle size of phosphor in a standard 40-watt fluorescent lamp to a range of from three to 30 microns, and by utilizing new manufacturing techniques, the scientists have developed a record light output of 80 lumens-per-watt. This is an increase of approximately 16 per cent over the most modern comparable lamps of one year ago.

The new process eliminates super-fine phosphor particles from the lamp coating, which it was found, caused excessive scattering and reflection of ultraviolet rays with a resultant loss of light output.

FREE
NEW SERIES
HOW-TO-DO-IT ARTICLES
on Commutator and Slip Ring Maintenance



Years of experience are packed into this new 6-article series — each an invaluable guide for keeping commutators and slip rings at peak performance.

Each article discusses a major part of the overall problem — gives practical tips on maintenance — tells how to solve common problems — what to do and how to do it — in easily read shop language. Supplied in attractive folder, forming complete maintenance data file.

Designed as useful refresher reading and trouble shooting guidance for the veteran maintenance man . . . and a must for the new man just "breaking in" . . . the entire series has been prepared in close consultation with leading, nation-wide engineering authorities.

Mail the coupon for Article No. 1 now. Don't miss it — the remainder of the series will be sent to you at regular intervals, free and without obligation.

IDEAL Preventive Maintenance
Everything in equipment and methods for Commutator and Slip Ring Maintenance.

IDEAL INDUSTRIES
1023-G Park Avenue, Sycamore, Illinois
Please send free folder and article No. 1 of series "Commutator and Slip Ring Maintenance."
Name_____
Company_____
Address_____
City_____ Zone____ State_____

Circle 9149 inside back cover.

WHO SWIPED PAGE 43

D'ja ever pick up a copy of PLANT and POWER SERVICES ENGINEER with an article torn out . . . or even worse, HALF an article torn out?

It's liable to happen when copies are routed around your plant.

You can avoid this annoyance by getting your own copy of PLANT and POWER SERVICES ENGINEER each month. It's easy and there is no charge. Just fill in the subscription request form opposite the inside front cover.

Weather data for air conditioning

The electric space heating and air conditioning committee of EEI has issued a 32-page compilation of weather data for various areas of the nation served by some 20 investor-owned electric light and power companies. Figures are given for both the heating and cooling seasons, showing average mean temperatures, dewpoint, humidity, etc.

A summary included in the report points out that there is a potential market for air conditioning equipment in the less humid areas, in the higher altitudes and in the normally cooler northern sections of the country, if cleanliness as well as the temperature and humidity control aspects are stressed.

Copies of "Weather Data For Humidity Control Air Conditioning" are available from Edison Electric Institute, 750 Third Avenue, New York 17, N.Y., at $1.00 per copy for EEI member companies and $1.50 per copy for others.

Characteristics of aluminum conductors

Alcoa has completed the first portion of a new, long-range program to prepare a basic series of technical reference manuals for the electrical industry.

This first section is a 20-page presentation of the latest available information on the current-temperature characteristics of both ACSR (aluminum conductor, steel reinforced) and stranded aluminum conductor.

The booklet contains graphs showing current-temperature characteristics for the most-used sizes of these conductors. Formulas are provided to facilitate calculation of characteristics for other sizes.

"Current-Temperature Characteristics of Aluminum Conductors," is available on request from any Alcoa sales office, or from 774 Alcoa Building, Pittsburgh 19, Pa.

Electroluminescent panels have varied colors

Electroluminescent panels that emit a soft glow of light in any one of six specific colors, instead of the single green, was announced by the Radio Corporation of America.

In addition to green, it is possible to have panels in greenish yellow, deep yellow, deep blue and white. The color red is produced in electroluminescent panels by means of supplementary luminescent material.

The panel produces a glare-free, cool light emanating from a flat area, it also has long life and low power consumption.

The panels, now in the final refinement stage in the laboratories, are pieces of specially coated glass or metal. They are two inches square, but can be made in larger sizes to meet individual requirements.

Simulates atomic power plant

An instrumented unit that "realistically" impersonates a full-scale atomic power plant and solves nuclear design and operational problems has been developed by Brown Instruments division of Minneapolis-Honeywell Regulator Company.

Although developed primarily as a training device for use by colleges and universities, the thermal simulator can be used independently for studies and experiments in the design and operation of nuclear power plants. To be operative, it is connected to another Honeywell device, a reactor simulator that behaves the same as a reactor using fissionable fuels.

Reactions and effects of virtually every type of nuclear power plants are duplicated by analog (electrical) computing circuits that simulate the heat transfer in a steam generator. Instruments identical to those on real reactors supply signals from the reactor simulator to the thermal simulator which, in turn, controls the rate of "fission."

The only kind of atomic power plant that cannot be simulated is a boiling-water reactor, which does not make use of heat exchangers.

Off-the-job safety

The National Safety Council has cited figures from a study of the off-the-job accident experience of 84 firms employing nearly 350,000 workers. The statistics show that accidents occur as much as five to 20 times more often off the job than on.

The study points out that a worker injured off the job is just as absent from work as one who has been hurt at his machine.

No. 1 injury, the study indicates, is slips and falls. No. 2 hazard is auto and truck accidents. For deaths alone, auto-truck accidents are the No. 1 killer of employees of all 84 firms.

All this, says the Council, emphasizes the urgent need for greater effort to prevent accidents off the job.

Gas turbine engine for vehicles

Development of a unique supercharged gas turbine engine of 300 hp has been announced by the Ford Motor Company.

The engine weighs only one-fourth as much as a truck diesel engine of comparable horsepower. Its fuel economy is said to rival that of a diesel and to be superior to conventional gasoline engines under most conditions. Under development for two and a half years, the engine weighs 650 pounds installed and has two stages of air compression.

Size is approximately 38 inches long, 29 inches wide and 28 inches high.

Ford expects to be testing the new turbine engines in vehicles before the end of 1959.

Cooling tower wood maintenance

A recent report prepared by the California Redwood Association concludes that, "The surface deterioration of redwood in cooling tower service may virtually be eliminated by avoiding the use of chlorine and using a non-oxidizing algaecide in the treatment of the circulating water."

The report adds that "the tendency for internal decay to develop will be reduced by the same water-treating practices which control surface deterioration."

A copy of this report on the eight-year study of cooling tower wood maintenance may be obtained from the Technical Division, California Redwood Association, 576 Sacramento Street, San Francisco 11, California.

Recovers chemicals, heat from sulfite liquors

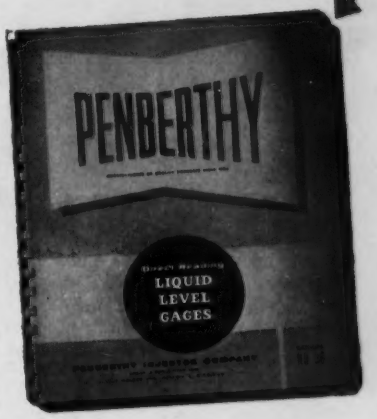
The pulp and paper industry's first commercial-scale installation of a new soda ash recovery process is now in operation at the Wisconsin Rapids Division of Consolidated Water Power & Paper Company.

Developed by Western Precipitation Corp., the process recovers pulping chemicals and heat from spent sulfite liquor. It should also prove to be a major stream improvement measure since the chemical recovery prevents discharge of collectible liquor into streams.

Basic principle of the process is the conversion of spent sulfite liquor into a non-corrosive solution that resembles the air-oxidized black liquor in kraft recovery equipment to be used. Earlier attempts at sulfite recovery required specially designed equipment to withstand the highly corrosive action of untreated spent sulfite liquor.

In the present commercial-scale experimental plant, 75,000 pounds of steam is produced per day for use in pulp manufacture.

GET THIS HANDY GUIDE TO BETTER VALVES AND GAGES



Shows complete line of Penberthy valves and liquid-level gages for power, petroleum, and process industries. Includes technical data, parts, price lists, and accessories such as:

HEATING AND COOLING GAGES... for accurate readings where liquids must be cooled or heated to obtain exact measurement.

INSTRUMENT VALVE... permits gage repair or replacement without shutdowns. Back-seating stem permits repacking under pressure.

FROST PREVENTIVE GAGE... eliminates frost build-up... assures dependable visibility. For industries where frosting interferes with accurate readings.

ILLUMINATORS . . . plastic wedge distributes bright, even light along entire column. Non-glaring... dustproof for perfect illumination.

WELDING PAD GAGES . . . where process conditions require observation windows as integral part of vessel.

PENBERTHY

Dept. PI

Penberthy Manufacturing Company
Division of Buffalo-Eclipse Corporation
1242 Holden Ave., Detroit 2, Mich.

Please send FREE copy of Catalog #36.

NAME_____ TITLE_____

ADDRESS_____

COMPANY_____

Circle 9150 inside back cover.

ASSOCIATION NEWS

. . . reports of conventions, papers and people from associations of interest to plant and power services engineers

NEMA standards

The following NEMA Standards Publications have been published, and copies are available for immediate distribution:

Industrial Heating Units and Devices: This publication deals with cartridge, tubular, strip and immersion heaters. Specific information is given for voltage and wattage ratings, dielectric strength, spacings, dimensions, terminations, sheath watts density and mounting holes.

Precision Snap-acting Switches: (IC 3) Has been expanded to include information on the application of industrial limit switches. Part 1 of this publication defines terms used in connection with precision snap-acting switches and remains unchanged.

Color Coding of Wires and Cables: The color coding of the following types of wires, cables and cords is the subject of this publication: asbestos, asbestos-varnished cloth and asbestos-thermoplastic insulated wires and cables; textile coverings for flexible cords; and POSJ flexible cords; rubber-insulated wires and cables.

Rubber-insulated Wire and Cable for the Transmission and Distribution of Electrical Energy: Both the Insulated Power Cable Engineers Association and NEMA have approved this publication which gives detailed information on conductors; insulation; shielding and coverings; cabling, fillers, binders and circuit identification; testing and test methods; pole and bracket cable; nonmetallic neoprene-jacketed mine power cables; preassembled aerial cable using copper conductors; and neutral-supported secondary and service drop cables.

Copies of the first three are available at 30 cents per copy. The rubber-insulated wire and cable booklet costs $4.00. All are available from NEMA, 155 East 44th St., New York 17, N.Y.

A new "steel"

A novel experimental steel-like material that may offer engineers a replacement for plain steel forgings and permit design flexibility of castings was reported at a recent American Foundrymen's Society Wisconsin Regional Conference.

Developed by GM Central Foundry Div. and Research Laboratories, the material, called CentraSteel, has steel's 28-million psi elastic modulus, plus equivalent strength and better machinability.

Other important properties — the material does not require extensive heat treatment, explosive or costly addition agents, injection apparatus or low maximum sulfur content.

Resulting from a research program looking for a means of producing as-cast malleable iron, CentraSteel has present in the as-cast condition a compacted type of graphite similar to the temper of malleable iron—a property which does not allow elastic modulus to be altered by heat treating.

The material is produced by inoculation with boron and tellurium of a low carbon, high silicon base composition. This high silicon — low carbon content is the reverse of normal iron founding experience.

Preferred composition includes 1.70% carbon, 2.25 silicon, 0.40 manganese, 0.10 sulfur, 0.05 phosphorus and 0.01 boron.

For high volume production, some foundry problems remain to be solved, and work on these is under way.

P and PSE wins Safety Award

In recognition of its contribution to safety through editorial, PLANT and POWER SERVICES ENGINEER has been awarded a plaque by The National Safety Council. The award was given in connection with the many articles dealing with safety presented throughout 1958.

Shown receiving the award from National Safety Council representative, Paul Sheppard, are (left to right) H. A. Countryman, editor, and George V. Michael, managing editor.

Rating book for packaged firetube boilers

The Packaged Firetube Branch of the American Boiler & Affiliated Industries announces publication of a rating book for packaged firetube boilers.

This book is published for the information of architects, engineers, contractors, and regulatory bodies.

A packaged steam or hot water firetube boiler is defined as a modified Scotch type boiler unit, engineered, built, fire-tested before shipment, and guaranteed in material, workmanship and performance by one firm, with one manufacturer furnishing and assuming responsibility for all components in the assembled unit.

Copies of the rating book can be obtained from the American Boiler & Affiliated Industries, Room 2502, 15 Park Row, New York, at $1.00 per copy.

Atomic industry directory

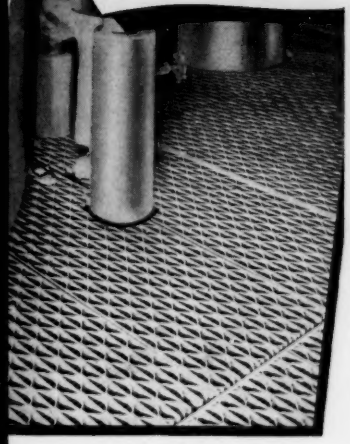
Publication of its 1959 Atomic Industry Directory of Products, Equipment and Service is announced by the Atomic Industrial Forum, Inc. Data-in-depth is provided through product and service "profiles" of more than 220 industrial organizations active in the development and utilization of atomic energy, including manufacturers, processors, architect-engineers and constructors, consultants and suppliers of technical research services.

Products, equipment and services are listed under 40 major classifications and more than 130 subcategories.

Data was developed by means of a comprehensive questionnaire.

Copies of the 1959 Directory are available on order from the Atomic Industrial Forum, 3 East 54th Street, New York, New York.

BOILER ROOM FLOORS MUST STAY SAFE, CLEAN



Ashes, coal and other substances under foot often make solid floors in boiler rooms unsafe.

Such hazardous materials cannot accumulate on a floor made of Irving open steel grating. Debris falls right through, making floors always clean. Dangerous fumes can escape through open grating. Floors made of Irving Grating are clean, safe at all times . . . no ankle turning, tripping, slipping, hot foots. It is fireproof, self-ventilating.

Manufacturers of Riveted, Pressure-Locked, and Welded Gratings of Steel, Aluminum and other metals.

"A FITTING GRATING FOR EVERY PURPOSE"

IRVICO

IRVING SUBWAY GRATING CO., Inc.
Originators of the Grating Industry

Offices and Plants at
5063 27th St., LONG ISLAND CITY 1, N. Y.
1863 10th St., OAKLAND 23, CALIFORNIA

Circle 9151 inside back cover.

LETTERS

Your views are welcome in this column. Address "Letters, Plant and Power Services Engineer, 111 East Delaware Place, Chicago 11, Ill." Letters should be brief and confined to the editorial of this magazine or other topics of interest to the plant and power services functions.

Finds useful

I am preparing a text which will serve as a guide to project engineers in the preliminary phases of their planning.

The charts and table on "Power Plant Costs", which appeared in the March, 1959, issue, is information which is quite useful at this stage.

May I have permission to copy and reproduce it, with full credit, of course, to the source?

P. N. GARAY
Kaiser Engineers

• *We are very happy to give reader Garay permission to include the information on power plant costs in his text.*
— The Editors

Reprints galore

In your May 1959 issue, you have an article, beginning on page 14, covering a new development in package boiler arrangement of which we would like very much to obtain reprints or tear sheets in a quantity of about 30 copies, if they are available.

M. J. CHURCHILL
Detroit Stoker Company

We would like to know if we may have 25 reprints of yours and Mr. Bishop's article on the packaged coal-fired boiler contained in your May issue.

ORD ALEXANDER
Engineering Consultant
National Coal Association

We have seen the article, "Large-capacity package coal-fired boiler exceeds efficiency AND capacity expectations", in the May issue of PLANT and POWER SERVICES ENGINEER.

This is certainly a fine presentation on this subject and contains some valuable information which will be quite helpful to us.

We should like to place our order for 2000 reprints of this article if it is possible to secure them.

CARROLL F. HARDY
Managing Director
Bituminous Coal Institute

• *Reprints have been sent, and we still have a limited number on hand. We will be very happy to supply additional copies to those requesting them.*
— The Editors

Story revived

I would like to receive a reprint of the article, "Automatic Colorimetric Boiler Water Analysis." The article was noted with interest in the Nalco publication *Abstracts of Current Articles on Water Treatment.*

The article appeared in your January issue.

HAROLD DORRIS
Electric Energy, Inc.

We would greatly appreciate receiving a copy of your January, 1959, publication or a reprint of the following article which appeared in this issue.

The article was entitled "Automatic Colorimetric Boiler Water Analysis" which appeared on page 22.

C. V. B. LaMOTTE
LaMotte Chemical Products Co.

We shall appreciate your sending a reprint or tear sheet of the following: "Automatic Colorimetric Boiler Water Analysis," Jan. 1959, Vol. 75, No. 1, p 22.

P. D. CLEMETSON
Vice President
HeatRite Inc.

• *As a result of our story being reviewed in the Nalco publication, we have received these and other requests of copies of the original story. We would like to supply others with copies, but unfortunately our supply is exhausted.*
— The Editors

the **NEW LOOK** *in* **GENERATOR DESIGN** *on large Onan gasoline and diesel plants*

Eliminates all moving parts in exciter and voltage regulator

Steps up performance in primary or standby installations

FASTER VOLTAGE RECOVERY—Rated voltage is restored within one second after load is applied or removed, compared to 5 seconds with rotating exciters.

LESS VOLTAGE FLUCTUATION—Voltage fluctuation with load changes is less than half that of standard-type generators.

GREATER RELIABILITY—Eliminates hundreds of electrical connections, the commutator and its brush rig.

FEWER ADJUSTMENTS—No extra sensitive adjustments necessary. Regulator has no delicate multiple contact points.

EASIER SERVICING—All exciter and regulator components are easily accessible. No dismantling necessary.

New Magneciter generators are now standard equipment on all Onan Electric Plants of 100, 125, 150, 175 and 200KW, as well as on many smaller sizes. A choice of Diesel or gasoline engine power is available on most Magneciter-equipped models. Complete specifications on any or all Onan units will be sent on request.

Onan
ELECTRIC PLANTS

D.W. ONAN & SONS, INC.
3329 University Ave. S.E., Minneapolis 14, Minn.

Circle 9152 inside back cover.

Completely New Concept from SCHAUB

In one package you get complete instrumentation, automatic after-cooling and sample cooling, automatic timed pressure flush to maintain high recovery efficiency, individual volume control valves, (with illuminated sight flow indicators), heat exchanger and flash tank. Matching cabinet sink is final touch. All interconnecting piping and wiring are installed. Only service connections need be made.

Ready-to-install Packaged Console for Continuous Boiler Blowdown and Recovery Handles all Functions Automatically

Saves Engineering Time, Saves Installation Time; Gives Maximum Thermal Recovery. It Does Not Forget, Mis-time, "Overshoot" or "Undershoot"

Schaub's continuous boiler blowdown and sampling system helps produce significant boiler room savings. With each operation performed exactly as it should be, when it should be, with no water lost in overflushing or overcooling, reduced costs can be anticipated. Thermal recovery is constant and at a high level. Mantime requirements are less. Space requirements are reduced. This Schaub Automatic Console System needs only field service connections to put it into full operation. Several man-weeks of design time, plumbing, steam fitting and wiring are eliminated.

For those boiler rooms where the fully automatic operation, complete instrumentation and cabinet design of the Schaub Console system may not be desired, Schaub can provide a ready-to-install "basic" system which provides all the functions of continuous blowdown, but under manual control.

Two, three or four boilers can be handled; either 250 pound or 600 pounds WSP. Capacities to 6000 lbs./hr. total blowdown. To learn further details on Schaub Systems for continuous Boiler Blowdown, mail the coupon below.

Please send me, without cost or obligation, my personal copy of your Bulletin 8001 on Continuous Boiler Blowdown.

FRED H. SCHAUB ENGINEERING COMPANY
2115 S. Marshall Blvd., Chicago 23, Illinois

FRED H. SCHAUB ENGINEERING COMPANY
2115 South Marshall Blvd., Chicago 23, Ill.

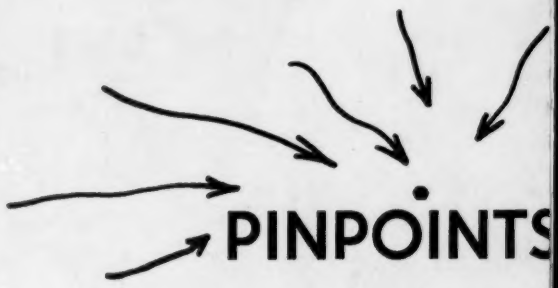
Name .....

Company .....

Address .....

City ..... Zone .... State .....

Circle 9153 inside back cover.



PINPOINTS

GEORGE V. MICHAEL, Managing Editor
with **E. N. SCHWALJE,** Electric Engineering Dept.
Public Service Electric and Gas Company of New Jers

IT's an easy thing for fires to spring up suddenly in air heaters of oil-fired boilers. These fires generally develop as local hot spots which are hard to pinpoint before actual damage from the fire occurs.

The fires spring up from combustible deposits on the surfaces of the air heaters and are believed to be actually fed by the oxygen in these deposits — not from the oxygen in the air.

In order to detect these hot spots before a major fire develops, it is actually necessary to scan the entire exposed surface of the air heater for over-temperature.

Such a temperature-sensing device consisting of a ceramic material enclosed in a 0.090-inch outside diameter inconel tube with two wires embedded at a fixed spacing in it is being used by Public Service Electric and Gas Company of New Jersey to announce localized high temperatures on the entire inlet and outlet rotor surface of the air heater. Three of these detectors are being used at the Linden generating station.

Sensing elements are placed immediately adjacent to the rotor in the form of a pie-shaped sector at both ends of the air heater. As temperature increases, resistance of the ceramic material decreases markedly, permitting increased current flow between the two wires.

One of the wires is grounded, and the other is fixed to insulated center pins mounted in the end fitting

The elements — sensitiv over entire length — come lengths of up in 20 feet. The can be connected to make u to 100-foot circuits.

The sensing element is cor nected to a control unit whic will sound an alarm whe temperature reaches a pres level (represented by flow current to control unit). F this particular service, t temperature control point set for 750°F (the elemen will respond to temperatur between 200°F and 1000°F). is possible to test the circu for proper setting by mea

JULY, 1959
VOL. 1 NO. 3
Plant Power Services Engineer

Peace of mind comes with the use of safety control devices that announce approaching dangers. Such a device at Public Service Electric and Gas Company of New Jersey . . .

AIR HEATER FIRES *before they happen*

f a switch on control panel. Control units are relay-operated and consist primarily f a Wheatstone bridge, relay nd potentiometer. When the Wheatstone bridge becomes alanced due to decreased resistance of the ceramic material, the current reverses and larm is sounded. System also as a power-failure alarm.

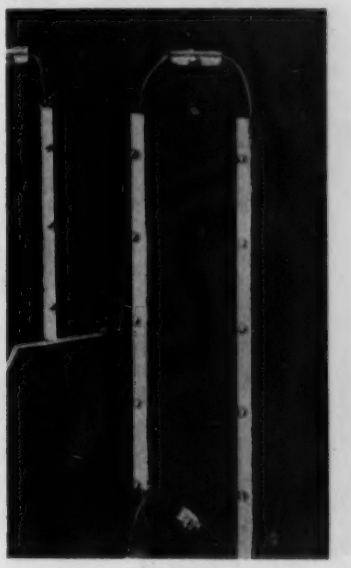
When overheat is eliminated, the resistance returns o normal, and normal circuit s restored.

The loop-type circuit permits testing with a local test utton and light. If sensing lement is severed, operation of the two connected pieces will continue because power is applied to both ends.

The detectors have been in operation since December, 1957. They are not tied into any automatic fire-fighting equipment. If a fire should occur — and none has to date — it would be extinguished by closing the isolation dampers and flooding the heater with water.

(Continuous-strip overheat detector is product of Walter Kidde & Company, Inc., Dept. P&PSE, 675 Main Street, Belleville 9, N.J.)
Circle 9154 inside back cover.

Close-up of temperature sensing elements (bottom right) and control unit (above) which sets off an audible alarm when temperature goes above preset level



Continuous-strip detectors were installed to scan the rotor end-surface temperatures of these air heaters to detect localized hot spots and give advance warning of fire possibilities

Present Depreciation Practice

LINK-BELT NEWS

Published by
LINK-BELT COMPANY
Prudential Plaza, Chicago 1, Illinois
and sent without charge to anyone who requests it on business letterhead

Vol. 24, No. 7 September, 1957

The Million Dollar Lathe

Have you heard about the lathe that cost $12,000 in 1942, but which took more than a million dollars to replace?

Employees at Thompson Products Co., Inc., heard about it in the company's annual report.

The *Cleveland Plain Dealer* heard about it and made the million dollar lathe the subject for editorial page treatment.

This is the story:

In 1942 Thompson Products bought a lathe. The cost was $12,000. Under Federal tax laws the cost could be depreciated over a 14-year period. So, last year, when the lathe had to be replaced, Thompson had $12,000 set aside, plus an additional $1,000 which was the resale value of the old lathe.

However, in 1956 a lathe that would perform the same functions as the old model that had sold for $12,000 in 1942 was selling for $35,000 and a new model with attachments to meet the advanced needs of the industry cost $67,000.

So the company found itself with only $13,000 to buy a $67,000 piece of equipment. The additional $54,000 had to come from profits.

But in order to clear $54,000, Thompson had to make a profit of $112,000 before taxes, and in order to make that much profit, the company had to sell more than $1,250,000 worth of products to customers.

It took a million and a quarter dollars of sales for the company to replace one lathe, and not one cent went to the stockholder!

A million and a quarter dollars to replace one machine so three Thompson employees—one shift—could continue working!

The *Cleveland Plain Dealer*'s editorial reaction to this method of presenting the business profit picture is to-the-point:

"This is something to think about when agitators scream about high corporate profits. No profits, no new machines, no jobs."

—*"Washington Report," Chamber of Commerce of the United States*

THE DEPRECIATION PROBLEM

When your company buys a new piece of equipment, it is interested in getting back only the best possible return from both the initial investment and operating costs. Technology has been directed toward producing equipment with the topmost in operating efficiency. However, no matter how efficient the piece of equipment is — and how fast it pays for itself — your company is still stifled (by accounting means) in writing this piece of equipment off its books and in being allowed to direct the profit realized from this equipment toward further expansion.

This problem stems from today's inflationary atmosphere and from the Federal Government's method of taxation, which does not allow your company to adjust for the inflated cost of the equipment when it figures taxes. By not allowing realistic allowances for depreciation, the extra money needed to replace that piece of equipment has to come from profits AFTER TAXES.

A good example of how drastic this situation can become is told in the story of "The Million Dollar Lathe" which you will find reprinted here. It tells how one company bought a lathe for $12,000 which cost over a million dollars in sales to replace.

Mr. Stewart, who has had a long and active interest in the depreciation problem, responded handsomely to a P&PSE request for a highly informative article on the subject. We think you'll find his rundown on the problem provocative.

— The Editor

Stifle Your Company's Growth

JAMES P. STEWART, President, De Laval Steam Turbine Company

A benefit arising from the present US-Soviet competition is the current emphasis on economic growth in the American economy. Unfortunately, too much of the discussion has concerned *rates* of growth rather than (1) an identification of the factors that make growth possible and (2) the encouragement of the economic climate which will best promote the development of these factors.

At the outset, hard choices will have to be made. For the ability of the economy to expand simultaneously both its "guns and butter" is, of course, limited.

However, whatever allocation of resources is chosen, that decision need not concern us here for the course of action is clear.

Whether our resources are to be devoted in large measure to economic and military competition with the Communist system, to the creation of more and better jobs, to the production of more goods at lower costs and thus the improvement of our standard of living, or to some combination of these goals, the fundamental first step is the expansion and improvement of our productive facilities.

This, in turn, is dependent upon our providing both the means and the incentive for a higher rate of productive investment.

Neil H. Jacoby, Dean, Graduate School of Business Administration, University of California, and a former member of the President's Council of Economic advisers, recently put it this way:

". . . a primary task of the next generation will be to find the capital to equip our expanding labor force with the most efficient tools and machinery in a world undergoing a second Industrial Revolution."

(From his testimony before the Joint Economic Committee of Congress, March 23, 1959.)

Technology Determines Investment

Early discussions of determinants of the volume of investment were confined largely to the two factors of population growth and material resources.

While these factors will continue to make their contributions, a third, technological innovation, is likely to far outweigh them in importance in the future. Its significance lies not only in the number of investment opportunities it makes possible, but in the fact that technological research and, to a lesser extent, technological innovation are more susceptible to direction.

Fortunately — or unfortunately if the proper steps are not taken — since most research of this nature can now be conducted for profit, the drives are the same as in the case of business investment.

What can we do to encourage a higher rate of productive investment?

Means and Incentives

In setting out to accomplish any task both the means (financial) and the incentive must be present. One without the other can at best be only partly effective. Yet, in the case of productive investment, the Government has imposed restrictions which seriously hamper both of the necessary conditions.

Let us examine some of the most significant restrictions.

Financial Means

Depreciation is obviously the best means by which productive investment can survive. In any discussion of depreciation, two facts stand out above all others:

— Depreciation is a cost of doing business. It represents a reasonable allowance for current capital consumption and should be judged in this light rather than as a potential "tax gimmick."

— Depreciation is normally the largest source of capital funds. In recent years, corporate depreciation accruals have averaged more than 60 percent of the total funds for plant and equipment expenditures.

The obvious question that arises is "Do current methods of tax depreciation realistically allow for depreciation costs?"

• The pattern of writeoff —

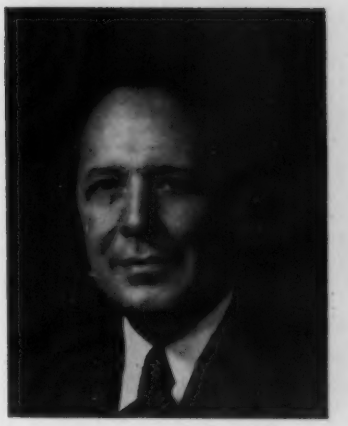
On the basis of both theoretical and empirical evidence, it would appear that the new methods of tax depreciation authorized by the Internal Revenue Code of 1954 provide substantial improvement in the *pattern* of writeoff.

• Effects of inflation —

In the two remaining aspects — the amount of the writeoff and the period to which the writeoff methods apply — our Government's policy is way behind that of other modern industrial nations.

It is common knowledge today that historical-cost depreciation accruals are grossly inadequate in face of in-

To next page



Having graduated from Cornell University in 1928 with a Mechanical Engineering degree, James P. Stewart has acquired wide and varied experience in both the technical and financial world. In addition to his duties as president of De Laval Steam Turbine Company — a position he has held since 1951 — Mr. Stewart is kept busy in a multitude of other activities.

These include — in addition to local and state activities — board member of the National Industrial Conference Board, member of the Executive Committee, Machinery & Allied Products Institute, member of the Industrial Problems Committee, National Association of Manufacturers, and past president of both the Compressed Air & Gas Institute (1952-53) and the Hydraulic Institute (1951).

He is also an active member in A.S.M.E., Society of Automotive Engineers, Society of Naval Architects and Marine Engineers, and the American Petroleum Institute.

THE DEPRECIATION PROBLEM *From preceding page*

flation. The frustrating experience confronting the businessman attempting to purchase new plants and equipment with the dollars made available through tax depreciation allowances is too well known to be documented.

It has been estimated by the Machinery and Allied Products Institute that this deficiency of historical-cost depreciation approaches $6 billion a year. The deficiency is doubly serious because not only is there serious underdepreciation but business is being taxed at a high rate on "illusory profits."

If the plant and equipment of the United States are **merely to be replaced,** this $6 billion deficit must be paid. The only source other than the depreciation account is that of "profits." But, as we shall see, other actions of the Government are making that source of funds inadequate even without this added burden.

Period of Writeoff

The Internal Revenue Service still relies, at least to some extent, upon Bulletin F tables as a "guide or starting point" in the determination of useful lives of depreciable property. (Under Secretary of the Treasury, Fred C. Scribner, has indicated that the Internal Revenue Service and Treasury Department are aware that some revenue agents have applied Bulletin F rigidly, and goes on to point out that the Service has attempted and is continuing to attempt to correct this attitude. His remarks were made before a Tax Executives Institute banquet, February 16, 1959.)

This determination, of course, affects (favorably or adversely as the case may be) the results obtainable from the application of the writeoff method.

Unfortunately, to base service life estimates for future equipment on past experience can be seriously misleading, for many business firms have been forced in recent years to retain equipment long beyond the period of economic justification, due to war and postwar shortages and inflation.

Even as to these firms which have deliberately adopted backward replacement policies, the philosophy of Bulletin F makes it difficult for them to change to a more dynamic practice.

Of crucial importance is the fact that the service lives contained in a bulletin last revised in 1942 could hardly reflect the explosive effect of recent technological change on obsolescence.

Therefore, the conclusion can be drawn that Bulletin F, in many cases, substantially overestimates equipment life without giving due weight to industry practice and technological obsolescence.

The net effect is that the deficiency in depreciation accruals arising from the inadequacy of the historical-cost recovery is aggravated.

Summarizing, with respect to the means with which industry would embark upon a higher rate of productive investment, the funds made available by depreciation allowances (when earned!) are negatively influenced by two factors: 1) the inadequacy of historical-cost accruals due to inflation and 2) the period of writeoff.

Incentive

The engine of the free enterprise system is profit.

If new investments and the technological research upon which they will be largely dependent are to be made, they must appear to be profitable to industry. And profitable means "profits *after* taxes."

Yet, the Government continues to penalize corporate investment by a 52-percent rate when it is obvious that, in terms of this analysis, it both limits a major source of capital funds, and, through lowering the prospective after-tax return on new investment, impairs the incentive of corporations to use the funds available.

With respect to the impact of the corporate income tax some startling conclusions are drawn in a new study entitled "Effect of the Corporate Income Tax on Investment", published in March by the Machinery and Allied Products Institute.

WHAT YOU CAN DO

In this article, Mr. Stewart analyzes the depreciation problem, and tells why it is important to all of us that some solution be found — and be found quickly. You can help — by getting on the bandwagon and by writing your Congressman.

Tell him in your letter that revisions are needed in the tax procedures stated in Bulletin F, so that a realistic depreciation allowance can be permitted for stimulation of industrial growth.

As industry grows so grows your earning power.

This publication documents the fact that the corporate tax — by forcing a company to require a prospective after-tax equity return at a much higher level before an investment project is justified — automatically excludes a whole range of investment proposals that would be eligible without the tax or at a lower rate of tax.

Such an increase in the corporate investment threshold means a deferment of project eligibility by several years. This deferment holds an umbrella over existing productive capacity.

To maximize new productive investment, we must — consistent with other objectives and requirements — provide both the financial means and incentive necessary.

At a minimum this would include:

• A realistic allowance for depreciation *in dollars equivalent to those originally invested.* Whether this is achieved through a purchasing-power adjustment, a special writeoff, or a speed-up of the historical-cost allowances themselves as, for example, by triple-declining balance of the Canadian class-rate approach, I leave to the experts.

I only suggest that we avoid the fate of the proverbial horse, equidistant between two piles of hay, who starved to death before he decided which one to eat.

• An appraisal of the corporate income tax not only as a source of Government revenue, but with respect to its effect on business investment. During a period when new production investment can be termed vital to our survival, it is incongruous that we foster a tax which at present levels substantially reduces the source of capital funds and impairs the incentive to invest available funds. ■

NEXT MONTH:

AIR POLLUTION LEGISLATION

Arthur C. Stern, Chief, Air Pollution Engineering Research, U.S. Public Health Service, tells what you should know about Federal and State activities in air pollution legislation.

Protective relay has no *moving* parts

- ***one-third the size of mechanical units***
- ***short resetting time***
- ***less sensitive to frequency variation***

Compact operating panel of static protective relay has three control knobs for variations of settings. Operation is indicated by neon lights that eliminate false target readings

Making use of commercially available semi-conductor devices such as diodes, transistors, thermistors, and varistors in combination with printed circuits, completely static protective relay does away with all moving parts.

Designed primarily for industrial switchgear application, the relay is 1/3 the size of mechanical units. Three single-phase units fit present switchgear and switchboard panel cutouts designed for one single-phase induction type.

Calibrations and settings are adjusted with three sets of external controls located at the front of each relay unit. Neon indicating lights for instantaneous and time-trip indications replace mechanical target indicators. With the neon indicator, false target readings are eliminated.

All relay components are mounted on a printed circuit board. A metal frame secures the board, and an epoxy potting compound makes the relay shockproof and impervious to moisture. Relays have been temperature-stabilized.

Since there are no moving parts, there is no inertia to overcome in operation. This feature enables the relay to adjust itself instantaneously to the prevailing load distribution. The resetting speed can be controlled in case such special control is required.

In cases where shifting loads in an electrical distribution system require close setting of relays, the relatively short resetting time offers distinct advantages. The relay functions without overshooting and will respond instantly to a change in current.

Less sensitive to frequency variation, the relay will maintain proper coordination during system disturbances where the frequency varies.

Since the power required to operate the relay is less than one-half volt-ampere, the relay may be operated by using small auxiliary CT's. It may also be connected directly across the secondary winding of the main current transformer, shunted by a resistor.

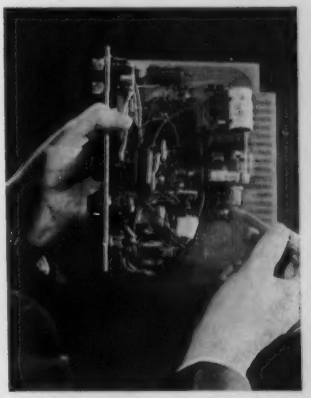
Installation or removal of the relay unit is simplified by a plug-in arrangement. The usual current transformer shorting switches are not required and therefore omitted.

The relay will be available in limited quantities this summer with switchgear equipment. Additional relay types will be introduced as rapidly as designs can be adapted for production.

(Static protective relay is a development of Allis-Chalmers Manufacturing Company, Dept. P&PSE, Milwaukee 1, Wisconsin.)

Circle 9155 inside back cover.

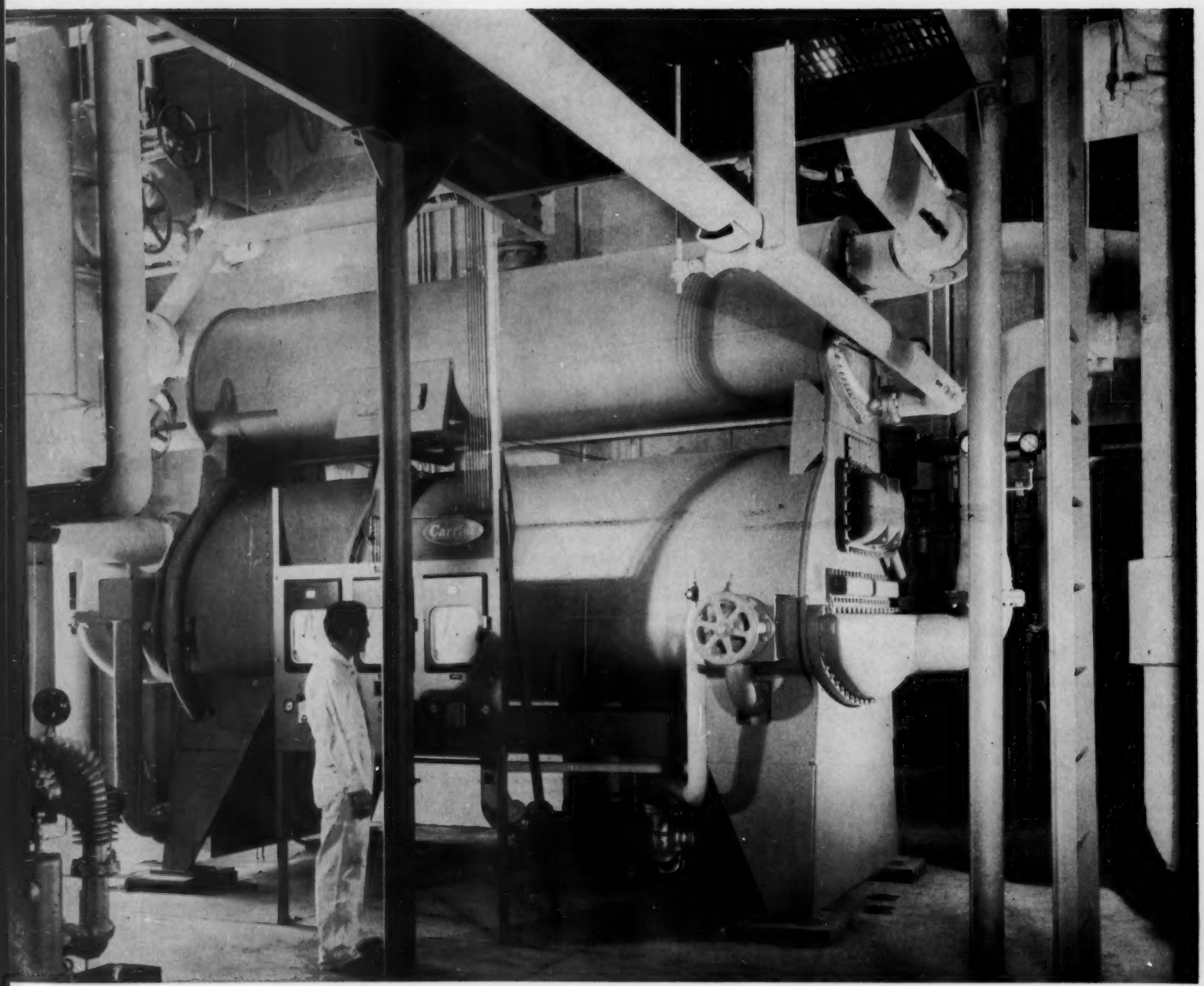
Mounted on a switchgear cubicle, three single-phase, static relays take up space required by one single-phase mechanical unit



Making use of transistors and printed circuits, completely static relay has no moving parts

Plug-in connector makes installation or removal of relay units simple. Usual current transformer shorting switches are eliminated

uses HTHW for heating -



-and COOLING too

CHARLES RODGERS
Plant Engineer
Lambert-Hudnut Mfg. Labs
with PandPSE Staff

View of one wing of Lambert-Hudnut's "L-shaped" packaging area. The 26,000-sq ft area is completely air conditioned through ceiling diffusers

LAMBERT-HUDNUT'S new multi-million dollar manufacturing laboratories at Lititz, Pa., boast not only the ultimate in modern production and plant services but feature a tandem heating and refrigeration system whose automatic operation has set a new standard in low first-cost investment, high efficiency, and minimum maintenance.

Secret to this top plant and power services set-up is the use of a high-temperature hot water (HTHW) system to operate both the heating and air conditioning equipment.

At time of construction in 1956, company management specified "the finest in employee comfort, winter and summer" — a factor that led to the consideration of the HTHW system.

Primary energy source is two 225-psig combination oil- or gas-fired package water-tube boilers feeding 400°F steam into two shell and tube heat exchangers for conversion to water at 340°F and 300 psig.

System is pressurized at 250 psi by nitrogen compression tanks to prevent flashing. The tanks are connected to suction side of HTHW circulating pumps from which system's "return water" is pumped through converters. Excess space and capacity have been provided for installation of third high-pressure steam generator if needed.

High-temperature hot water is distributed throughout the plant to unit heaters, finned radiation, radiation panels and heat exchangers for domestic and process hot water. Pressure-reducing valves control process steam for mixing tanks making shampoo, face creams and other cosmetic products. Domestic hot water requirements are served through valves limiting water flow to prevent hot water temperature from exceeding 140°F.

Initial analysis of plant requirements made by the consulting engineers, A. M. Kinney, Inc., Cincinnati, showed that "more than 92% of maximum design heating load would serve for comfort — less than 8% was required to supply heat to steam-jacketed process equipment."

Air Conditioning System

While steam is the most widely used energy source for absorption chilled water machines, hot water, hot oil, or a wide variety of other high temperature fluids can perform the job.

Despite early cost estimates establishing a $5000 lower initial cost for a motor-driven compressor system, four salient arguments led to the choice of absorption refrigeration:

- Since the heating plant was required throughout the year to supply process needs, substitution of cooling loads in summer resulted in more efficient and economical boiler operating conditions, in addition to supplying heat energy normally required on an incremental cost basis.
- The plant is located in a light industrial area where high demand charges for electric power would be calculated on a 12-month period wherein highest billing demand is determined by the peak electrical load attained during operation of the air conditioning system.
- Operating savings through absorption would also be increased proportionally in future plant expansion.
- Absorption machine's ability to modulate under all load conditions from zero to maximum capacity permits maintenance personnel to attend to other jobs.

Lambert-Hudnut has one operator attending both boiler room and air-handling systems.

Chilled Water Operation

The absorption machine in the boiler room provides 424 tons of refrigeration — chilling 1000 gpm of water for distribution to office central conditioning apparatus and plant apparatus (located behind manufacturing area).

In operation, 182 gpm of hot water enters the absorption machine's generator at 340°F and leaves at 240°F. In the generator, the temperature of a lithium-bromide solution is raised to boil off excess water vapor. Reconcentrated salt liquid is returned to an absorption chamber where, un-

To page 49

Absorption machine (424 tons capacity) is actuated by 340°F water to provide 45° water for circulation to air handling units throughout Lambert-Hudnut laboratories. Machine's ability to modulate under all load conditions — from zero to maximum capacity — allows minimum supervision

SOME FACTS ABOUT HTHW

—A given volume of hot water carries more Btu's than an equal quantity of steam. At 300 psig, a cubic foot of water cooling from 340° to 190°F liberates almost 8400 Btu's as compared to approximately 300 Btu's liberated by same volume of saturated steam at 340°F condensing and subsequently cooling to 190°F.

—Boiler room costs — slightly higher for HTHW than equivalent steam or conventional hot water equipment — are offset by savings through smaller pipe sizes for distribution lines.

—System maintenance is reduced by substitution of simple circulating pumps in place of condensate receivers, pumps, and traps.

—In a closed system, scaling and corrosion in equipment and piping (standard carbon steel) is prevented by periodic internal chemical treatment — instead of continuous feed-water treatment.

—High thermal capacity of system's water (constant pressure of water mass creates inertic effect) prevents sudden load changes on steam generators, resulting in higher operating efficiencies. Transmission heat losses are as low as 6% compared to 10% in steam distribution lines.

—HTHW has ability to provide more accurate and uniform control of heating temperatures.

Titanium and Zirconium: their future in Plan

G. W. BAUER
Mallory-Sharon Metals Corporation
Niles, Ohio

Although titanium and zirconium were discovered late in the eighteenth century, it has only been within the past twenty years that practical methods have been developed for reduction of both metals from their ores—and only within the last decade could these metals be considered as structural materials available in production quantities.

Titanium, because of its outstanding strength-to-weight ratio up to 1100°F, has been used primarily for aircraft applications but its excellent corrosion resistance and other desirable physical properties are daily increasing its commercial applications in the chemical, food, pulp and paper, marine, plating and anodizing industries.

Zirconium, with its low neutron absorption cross-section and good corrosion resistance, finds its largest application in fuel elements for atomic reactors. However, like titanium, zirconium is finding wider use in commercial markets for corrosion resistant applications.

Zirconium and titanium are quite abundant; in fact, titanium is the fourth most abundant metal in the earth's crust — being exceeded only by iron, aluminum, and magnesium. Fabrication and melting of these two metals is quite similar and requires careful control to avoid excessive contamination by atmospheric gases at elevated temperatures.

The technology of machining, welding, and making finished products of titanium and zirconium has advanced remarkably within the last ten years and at this time both metals may truly be regarded as proven structural materials. They are available as billet, bar, plate, sheet, strip, foil, tubing, wire, and in other special forms such as expanded sheet, wire cloth, fasteners, castings, forgings, etc. Both metals have found extensive use in pipe, valves and fittings.

It is apparent from Table I that titanium and its alloys offer quite a wide range of strengths; in fact, strengths from 30,000 psi to over 200,000 psi are attainable by using either high purity titanium or by heat treating any one of several titanium alloys. As shown in Table II, the electrical resistivity of titanium is quite high for a pure metal. The MST-821 titanium alloy has a resistivity of 190 microhm-cm at room temperature, and some experimental alloys of titanium exceed 200 microhm-cm.

Other titanium properties of interest are the fact that it is paramagnetic, having a magnetic permeability of 1.0001; it is light, weighing only 56% as much as stainless steel; and some of its alloys (MST-821, for example) have as good or better resistance to oxidation than stainless steels up to 1200°F. Commercially pure titanium, on the other hand, is not recommended for continuous use above 1000°F (unless in vacuum or protective atmosphere) and functions quite well as a getter.

Titanium Applications

Titanium's light weight, high strength and corrosion resistance make it highly suitable for an application very important in power — steam turbine blades. Thousands of tons of titanium alloys have been used in jet engine turbine blades and related parts and several steam turbine manufacturers are now carrying out research which will enable them to utilize titanium alloy steam turbine blades in one or two years.

Titanium not only has corrosion-erosion resistance in wet steam comparable to that of presently used materials, but the tremendous weight savings possible with titanium are expected to more than justify its cost. Probably the most important benefit to be derived from the use of titanium steam turbine blades will be the ability to achieve much longer blade length with resultant increase in power output.

Commercially pure titanium is being used extensively in vacuum tubes because, in addition to the properties noted above, it has a coefficient of expansion similar to several ceramics which allows satisfactory high temperature operation.

Titanium can be effectively outgassed at 1300°F and can function as a getter for the life of the tube because of its high affinity for most atmospheric gases.

Although several titanium

TABLE I

MECHANICAL PROPERTIES OF TITANIUM, ZIRCONIUM, AND SELECTED ALLOYS*

	Commercially Pure Titanium		Titanium Alloys		Commercially Pure Zirconium	Zircaloy 2
	MST-40	MST-70	MST-6Al-4V	MST-821		
UTS, ksi	65	90	140	135	65	75
0.2% YS, ksi	55	75	125	120	40	50
% El, 2"	24	20	15	15	25	20
% Reduction in Area	50	35	30	30	45	40
Mod. of Elast. psi x 10^6	15.5	15.5	16.0	17.0	14.0	14.0

*Typical annealed room temperature properties listed.

nd Power Services

alloys have very high electrical resistivity, commercially pure titanium is used as an electrical conductor in several applications including anodizing racks and tips and anode hooks and baskets for electroplating. Titanium would normally be attacked by sulfuric acid in concentrations used in the anodizing of aluminum or the plating of nickel, but it becomes immune to attack when made anodic.

A significant improvement in nickel plating has been the introduction of titanium anode hooks which can operate submerged in the solution, thereby reducing scrap loss. Another indirect electrical application for titanium is in soldering jigs for electronic components, since many solders will not stick to titanium. One company has made titanium rotor and stator for several motors which must operate in a highly corrosive atmosphere.

Promising future applications for titanium and areas where extensive research is presently in progress are:

High Temperature Rectifiers — Titanium dioxide ceramics or metal oxide films are being intensively studied.

Electrical Resistors — Some titanium alloys have nearly twice the resistivity of standard resistor materials and approximately half the density, so that use of titanium can be economically justified. Note the low temperature coefficient of resistance for MST-821 alloy in Table II.

Electrolytic Capacitors — Experiments with high purity titanium indicate a promising potential for low voltage, high temperature capacitors. Titanium's high dielectric constant of approximately 100 aids in miniaturization of capacitors.

Vacuum Tube Grids — Titanium has lower grid emission than most other metals.

Metal Film Resistors — A relatively new area in which titanium, as well as other metals, is being investigated.

Insoluble Anodes — When plated or clad with a very thin layer of platinum which carries the current, titanium functions very well in insoluble anodes for chemical processes and cathodic protection systems.

Zirconium Applications

Zirconium powder has been

To page 49

Author Bauer with some titanium and zirconium products

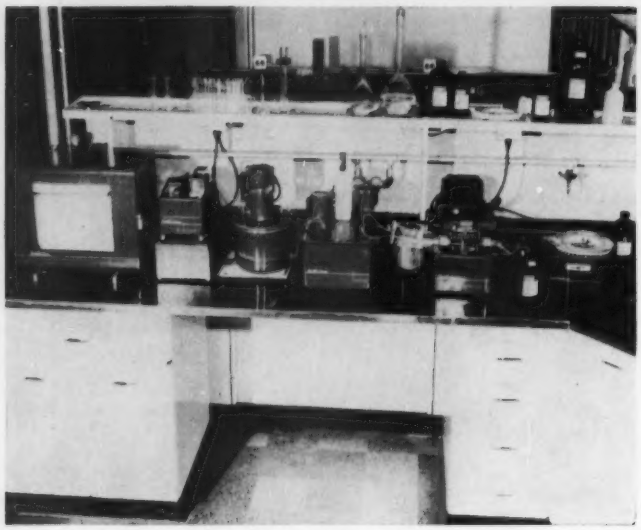
TABLE II

PHYSICAL PROPERTIES OF TITANIUM, ZIRCONIUM, AND SELECTED ALLOYS

	Commercially Pure Titanium		Titanium Alloys		Commercially Pure Zirconium	Zircaloy 2
	MST-40	MST-70	MST 6Al-4V	MST-821		
Density, g/cc	4.51	4.54	4.46	4.37	6.51	6.56
Density, lb/in^3	.163	.164	.161	.158	.235	.237
Melting Point, °F.	3040	3100	2900	3000	3350	—
Coefficient of Linear Expansion (68-1200°F.) in/in/°F x 10^{-6}	5.4	5.4	6.1	5.0	3.2	3.7
Thermal Conductivity (68-1200°F.), BTU/hr/ft/°F	10.6	10.1	9.2	8.7	12.2	8.2
Electrical Resistivity (68° F.), microhm-cm.	50	60	160	190	40	75
Temperature Coefficient of Resistance, x 10^{-4}/°C	30-40	25-30	4	3	45	—

NEW SOLUTIONS

for your plant and power services problems



Automatic analyzer can be used in lab or field to monitor liquid or gas streams

Analyzes 5000 water samples per week automatically

A robot analyst accurately and quickly does some 5000 analyses of water samples each week taken from air conditioning installations, domestic water systems and boilers.

The water samples — taken from installations serviced by Water Service Laboratories, New York — are analyzed to insure that the proper kind and amount of water treatment chemicals are being fed at each installation.

Previously, samples were manually analyzed, a process involving a series of individual operations that had to be repeated for every sample. Sample measurement and preparation, dilution, and reagent addition were accurately duplicated for each analysis. Many of the chemical reactions required a time delay to insure completion. Comparison and recording were done manually.

The instrument is a photoelectric colorimeter equipped with automatic devices which provide continuous sampling, addition of chemical reagents, separation of impurities, mixing, measuring of color, and recording of results.

Once it is properly calibrated for each analytical method, it can carry out as many as sixty analyses per hour.

Among the materials it is being used to measure are silica, phosphates, iron, copper, sulfates and chromates. The instrument can measure many of these materials in parts per billion in water.

Although, in this particular installation, the instrument is being used in a laboratory, it can be used in the field to monitor liquid and gas streams continuously.

(Autoanalyzer is manufactured by Technicon Controls, Inc., Dept. P&PSE, Chauncey, New York.)
Circle 9156 inside back cover.

Plastic "surgery" saves diesel from corrosion

Texas Tower No. 2 — man-made radar island situated 110 miles off Cape Cod — was suffering from galvanic corrosion of the copper-nickel alloy piping used in the salt water cooling system for the diesel generators providing power.

The severe damage to the piping was discovered when one of the two banks of generators on the multimillion-dollar plane-watching station was shut down for repairs.

Engineers attacking the problem prescribed rigid unplasticized polyvinyl chloride (UPVC) pipe and fittings. Working around the clock for a month, crews changed all the piping in the generators' cooling system.

They used normal-impact four-inch piping joined with UPVC fittings and injection-molded flanges.

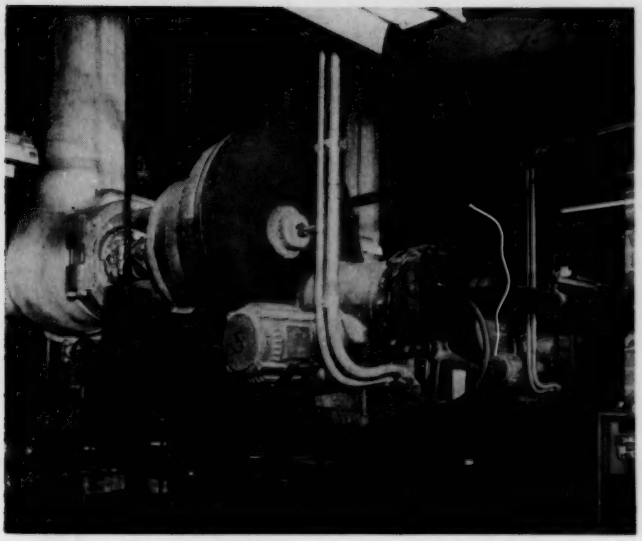
Two years have passed since the emergency operation. The corrosion problem should be permanently eliminated, according to past deterioration tests. In addition, the installed cost of the UPVC piping was about half that of the previous piping, which had a life expectancy of only 18 months.

The particular problem encountered on the radar island stemmed from the use of two dissimilar metals in the presence of salt water. In this particular case, it was the copper-nickel alloy piping and stainless steel coolant jacket — in combination with the salt water coolant — that created an electrolytic cell. The copper alloy became the anode and would eventually have been eaten away.

The plastic piping met the joint requirements of not causing electrolytic action and being impervious to salt water corrosion. Its inherent strength and permanently tight joints readily withstands the vibration created by the generators and stresses imposed by stormy seas. The normal-impact pipe and fittings are easily capable of handling the coolant temperatures of 40° to 75°F and operating pressure of 85 psig.

(UPVC pipe and fittings are manufactured by Tube Turns Plastics, Inc., Dept. P&PSE, Louisville, Ky.)
Circle 9157 inside back cover.

The operation was a success!



Angle valves have motor operator larger than any in existence

Valves handle feedwater flow of 2 million lb per hr

Lines to and from the twelve high-pressure, multiple-pass feedwater heaters in the new Thomas A. Allen station at Memphis are equipped with valves that are the largest of their kind ever built.

The 16-inch motor-operated valves were designed to ASA specifications for service at 2840 psi and 90°F. Each valve handles a flow of 2 million lb of feedwater per hour. They are designed to provide tightness when closed at 2840 psi under the disc. This closure condition required the development of a valve motor operator larger than any in existence. It provides the necessary half million pounds of thrust, which is handled by the five-inch diameter valve stems.

All valves are the pressure-seal bonnet type.

(Pressure-seal valves are manufactured by Crane Co., Dept. P&PSE, 836 S. Michigan Ave., Chicago 5, Ill.)

Circle 9158 inside back cover.

Stands watch over combustible gases

Giving an accurate indication of the degree of concentration, a combustible-gas analyzer tests the atmosphere continuously for the presence of combustible gases or vapors in explosive quantities.

The safety device can give a visual signal, energize an alarm, close or open process control valves, and/or activate ventilation fans.

Two such devices stand eternal watch over The Huntley Steam Electric Station of Niagara Mohawk Power Company. The alarms protect two hydrogen-cooled 100,000-kw generators by constantly sampling the atmosphere at eight points on each generator to detect escaping hydrogen.

If a mechanical defect allows some hydrogen to leak, the robot "watchman" can within seconds detect and point out the exact spot of the leakage. Repair crews then speed to the spot and repair the damage.

The loud, penetrating horn can be heard despite the rumble of the generators.

Small sample pipes are installed at eight points at the generator where leakage would be most likely. Because hydrogen rises, these sampling points are located near the ceiling.

Atmosphere sucked into the pipes is carried through the system to the analyzer, where it is analyzed automatically when it passes over a heated detector filament, part of a balanced electrical bridge circuit.

Any flammable gas in the sample actually burns on the surface of the heated detection filament. If combustion does occur, it increases the filament temperature. This, in turn, increases the filament's electrical resistance, causing an unbalance in the electrical bridge.

The degree of unbalance is measured on an indicating meter, a contact-making relay or a recording potentiometer.

It takes only four minutes to check all eight sampling points. A continuous flow of the atmosphere samples is maintained through the instrument by means of a vacuum pump.

Safety device stands 24-hour guard against explosive concentrations of hydrogen at Huntley Station

Flashback arrestors prevent propagation of flames back to sample source. Replaceable dust filters are installed in the air and sample inlet lines.

Since their installation in 1954, the instruments have twice detected hydrogen leakage caused by defective seals.

(Combustible gas analyzer is product of Mine Safety Appliances Company, Dept. P&PSE, 230 N. Braddock Ave., Pittsburgh 8, Pa.)

Circle 9159 inside back cover.

This substation at Kodak Park receives power from two independent sources, transfers load automatically through action of silicon rectifier control transfer system

Silicon rectifier control assures continuous power

For the conversion of alternating to direct current, silicon rectifiers provide insured continuity of critical processing for Eastman Kodak Company, Rochester, N.Y.

Installed in the transfer control circuit of a dual substation, the rectifiers provide control power to switch all load automatically to a second primary source in the event of failure of the first source.

First of its kind ever developed using silicon rectifiers, the control arrangement is included in the substation powering a multi-million dollar polyester film manufacturing facility. Operation will be round-the-clock, seven days a week.

Until now, transfer control had been supplied primarily by batteries. In place of the battery-powered systems, an AC automatic transfer control contactor and/or AC voltage-chasing transfer control scheme can be used. However, silicon rectifiers now have been developed sufficiently that they can be used to permit a solidly connected rectified DC secondary control bus whose primary may be two or more separate power sources.

The voltage of this DC control is maintained automatically at the proper level, so that a primary transfer can be made just as long as only one of the two or more primary sources holds its voltage.

Many double-fed load centers are used at Kodak Park at critical locations where continuous power is required. During normal operation these centers function with the tie breaker open.

If a power outage occurs on either end, the main breaker on that end opens automatically and the tie breaker closes to restore power. A voltage failure on both ends produces no breaker operation.

When sensing a bus fault — excessive current through a main breaker — with or without voltage on either end, the control opens the main breaker and keeps the tie breaker open.

This requires stored energy only for tripping the main breakers. There is no requirement for closing or opening with an outage on both ends, and Kodak's operating practices preclude the possibility of energizing a shorted secondary bus directly by primary switching.

The control power supply system, substituting silicon rectifiers for batteries does not appreciably affect interchangeability of devices or control schemes. Testing procedures were modified to some extent.

In the system, the closing power for main and tie breakers is taken directly from the control bus. Trip circuits of main and tie breakers are also energized directly from control bus.

The main breakers may be tripped at any time within approximately eight seconds after all primary power is removed, through use of the stored energy available across the trip circuit capacitor.

(More information is available from I-T-E Circuit Breaker Company, Dept. P&PSE, Philadelphia, Pa.)
Circle 9160 inside back cover.

Beats possible corrosion from coal dust slurry with plastic pipe

Problem: Collecting coal dust and carrying it as a slurry presented a serious corrosion problem at the Pittsburgh Works of Jones & Laughlin Steel Corporation.

The dust comes from three pulverizers used to crush coal, needed to fire boilers in the Works' Blast Furnace Dept. As part of the pollution abatement program, three gas scrubbers were installed on the pulverizer vent pipes to collect the dust.

The collected dust is then pumped as a slurry to a point 350 ft from the pulverizers where it is mixed with ore dust. Before installation, it was expected that high sulfur content of the coal slurry would create a severe corrosion problem if carried in regular pipe.

Solution: To avoid this problem, J&L's Product Development Division and Electricweld Tube Division developed a new kind of pipe. It consists of a rigid polyvinyl chloride lining encased in a steel jacket. The plastic lining gives resistance to broad range of corrosive fluids. The steel jacket gives it strength, enabling it to carry fluids or gases under higher pressures.

Results: In over six months' operation, not a trace of corrosion has developed.

Steel-jacketed plastic pipe handles corrosive fluids yet is strong enough for pressures of 1000 psi at 150°F

In addition, the pipe was installed easily and quickly. Mill-rolled grooves at the ends enable pipe lengths to be joined by grooved couplings. These lock into place, assuring a positive seal at the joints and allowing reassembly without damage to lining.

The electric-resistance-welded steel jacket encasing the lining overcomes pressure limitations common to most plastic pipe. Working pressures of 1000 psig at 150°F can be attained with the design.

It is manufactured in 20-ft mill lengths in 2″, 3″ and 4″ nominal OD sizes.

(Jal-Jacket pipe is product of Jones & Laughlin Steel Corp., 3 Gateway Center, Pittsburgh 30, Pa.)
Circle 9161 inside back cover.

VIBRATONES produce more noise, use less current, take less space, less time to install and need less attention, than any audible signal now on the market.

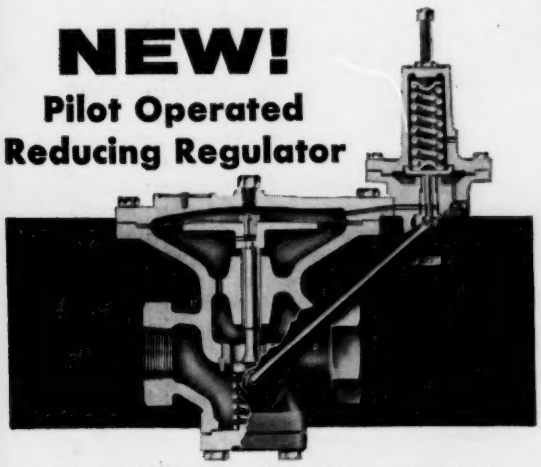
Every feature of their design and construction is a radical departure from past practice. The simple 2-screw installation and adaptability to existing wiring devices, is an electrician's delight and a money saver for you. "Horn signals can save you money and even lives."

If you haven't read about the *VIBRATONE* write for Bulletin #27.

FEDERAL 8709 S. State St., Chicago 19, Ill.
Sign and SIGNAL Corporation

Circle 9162 inside back cover.

NEW!
Pilot Operated Reducing Regulator



No. 201-21 Pilot Operated Reducing Regulator features an easily accessible external pilot, bolted directly to the main valve; stainless steel pilot and main valves; fast, accurate response to pressure changes; large capacity, and tight shutoff. Made with iron bodies with screwed connections ¾" through 2" size; ASA Class 250 flanges, sizes 2" to 4". Pressure ranges 2-12; 8-50 and 25-150 psi.

Ask your Mason-Neilan Industrial Distributor. He is ready to serve you and to ship promptly from stock. Ask for catalog or write direct.

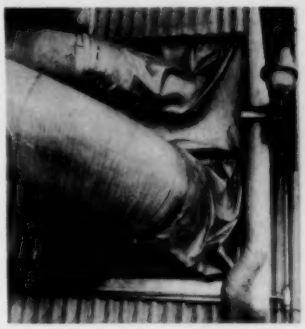
MASON-NEILAN
Division of Worthington Corporation
69 NAHATAN ST., NORWOOD, MASS.
Order from your Mason-Neilan distributor — use his experience — save work — save time. MN9-12

Circle 9163 inside back cover.

Keeps holes watertight when pipes go through walls

A successful, low-cost method of weatherproofing wall openings through which steam and water pipes enter the plant has been used by South Carolina Electric and Gas Company at its new McMeekin Steam Electric Generating Station.

Generally, a rigid arrangement is impossible for this purpose, because the pipes expand and contract with varying temperatures, and they may move as much as three inches in any one direction.



Long-lasting material weatherproofs wall openings through which pipes enter plant

A flexible material is a good solution. However, it would have to stand up to the relatively high temperatures and humidity present and not rot or tear away.

To provide a lasting weatherproofing, a neoprene-coated nylon fabric was suggested. The material is held around the pipes with clamping bands and secured to the walls with clamping flanges and strips.

The temperature at the points where the material is in contact with the insulated pipes ranges from 50° to about 150°F.

Total cost, including labor, for the installation was about $650.

(Coverlight-N material is made by Vulcan Rubber Products Division, Reeves Brothers, Inc., Dept. P&PSE, 1071 Avenue of the Americas, New York 18, N. Y.)

Circle 9164 inside back cover.

WHAT YOU SHOULD KNOW ABOUT AIR TOOL UPKEEP

NON-FLUID OIL
TRADE MARK REGISTERED
is compatible with water

Until the introduction of NR Grades of NON-FLUID OIL, users of all types of pneumatic powered units have fought a losing battle with the moisture content of all compressed air. No regular oil worked with this moisture; it was a constant fight with power and efficiency on the losing side.

NR Grades work on the logical principle, "if you can't lick it, join it." Our specially designed and engineered grades for pneumatic service form a permanent emulsion with this airborne moisture, thus eliminating the normally accepted sticking, gumming and rusting. That's why pneumatic tool manufacturers use and recommend the NR Grades of NON-FLUID OIL for their tools.

Write for Free Testing Sample and Bulletin No. 550.

NEW YORK & NEW JERSEY LUBRICANT COMPANY
292 Madison Ave., New York 17, N. Y.
WORKS: NEWARK, N. J.

WAREHOUSES

Birmingham, Ala.	Charlotte, N.C.	Springfield, Mass.	Providence, R.I.
Atlanta, Ga.	Greenville, S.C.	Greensboro, N.C.	St. Louis, Mo.
Columbus, Ga.	Chicago, Ill.	Detroit, Mich.	

Also represented in principal industrial centers, including Pittsburgh, Pa., Cleveland and Cincinnati, Ohio

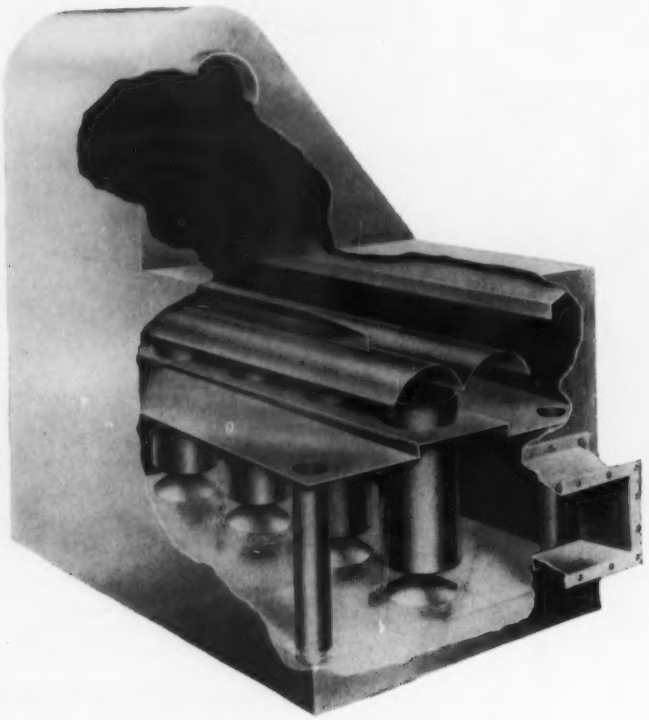
NON-FLUID OIL is not the name of a general class of lubricants, but is a specific product of our manufacture. So-called grease imitations of NON-FLUID OIL often prove dangerous and costly to use.

Circle 9165 inside back cover.

NEW DEVELOPMENTS

for

effective plant and power services operation



Wet dust collector uses circular venturi which permits longer retention time of dusty air in cleaning element

Wet dust collector handles floating material effectively

Hydrostatic dust collector employs a circular venturi which introduces a mixture of dirty gas and water mist into a vertical cylinder.

The cylinder permits a longer retention period of the dusty air in the cleaning element thus increasing the probability of water and dust particle collision.

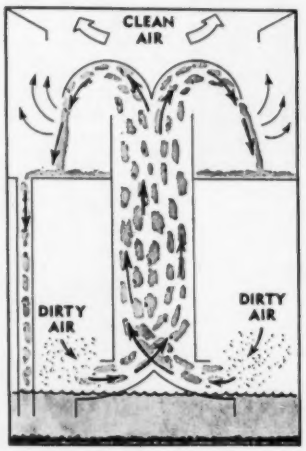
The water is removed from the air stream by a circular baffle which is in itself an effective dust impingement surface.

By venturi variations, the collector can meet any wet collection application. It is capable of effectively handling floating material which is normally difficult with comparable equipment.

Dust disposal arrangements include: flat bottom hoppers for manual cleaning, triangular hoppers for continuous flushing, chain and paddle scraper for flat-hopper sludge removal, and separate settling hoppers with any of the above arrangements.

Materials of construction are varied to meet particular needs — ceramic, porcelanized steel, or stainless steel collector elements are available.

("Mist-O-Miser Dustrax-

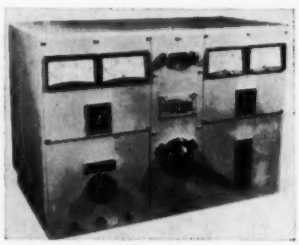


PRINCIPLE OF OPERATION

tor" is a development of Fly Ash Arrestor Corporation, Dept. P&PSE, Birmingham, Alabama.)
Circle 9166 inside back cover.

Controls all makes engine-generator sets

Line of electric controls are applicable to all makes of engine-generator sets used in emergency standby power, portable power and special prime power applications. Pedestal-mounted, floor- or wall-mounted units are available.



Pedestal-mounted generator control cabinet for AC and DC applications

Utilizing prefabricated panel mounting plates and wiring harnesses, design allows each control feature to be added like a building block. Universal terminal blocks eliminate complex rewiring for instrument adaptations. One harness connects all basic equipment, and supplementary instrument harnesses can be quickly added by following diagrams.

The pedestal-mounted generator control cabinets are designed for a wide variety of AC and DC applications, single or dual voltage, for generators up to 500 kw. Their controls assure stable voltage at any load within the generator range.

Cabinets accommodate any combination of instruments, switches and voltage regulators. Floor- and wall-mounted units provide positive control of generators as one unit or in multiple units for large power installations.

(Generator controls are manufactured by Akro Industries, Inc., Dept. P&PSE, 406 The Arcade, Cleveland 14, O.)
Circle 9167 inside back cover.

Aluminum-asphalt coating reflects heat on roofs, tanks, water towers

By adding aluminum flakes to a specially prepared asphalt base, coating reduces inside temperatures while providing protection on roofs, water towers, storage tanks, exterior walls of cement or cinder block construction, downspouts and gutters.

The coating will reflect up to 71% of the sun's heat and reduce under-roof temperatures as much as 15°. In addition, long-term protection is given against severe weather conditions.

While giving surfaces a highly polished finish, the coating's reflective properties prevents the sun from drying out asphaltic oils with subsequent cracking of surface.

The material can be easily applied with brush or squeegee. Ready-mixed and ready-to-use, it requires no thinning or heating.

(RIW Asphalume is product of Toch Brothers, Dept. P&PSE, 2600 Richmond Terrace, Staten Island 3, N.Y.)
Circle 9168 inside back cover.

Plastic lead putty handles many repair jobs

Putty-like lead material made up of 94% lead and 6% plastic can be formed into any shape without heat or pressure.

Material becomes a tough, durable mass very similar to lead within two hours after the addition of a special hardening agent. Once hardened, it can be drilled, sawed, or machined with regular tools.

Having high impact, compression and tensile strength, it bonds lead, steel, aluminum, bronze, brass, wood, iron, porcelain, and many other materials to themselves or each other. Containing no volatile solvents it is non-shrinking and non-flammable.

Applications include splicing or repairing lead cables and general maintenance work. It has proved valuable in making shields against radioactive materials.

Material is available in one, four, and twenty-five pound units. Each unit is packed with the exact amount of hardener, sufficient release agent, measuring spoons, and complete instructions.

(Devcon L is manufactured by Devcon Corporation, Dept. P&PSE, Danvers, Mass.)
Circle 9169 inside back cover.

Eliminates rust problems

Eliminating scraping, wire brushing or sand-blasting, coating material goes on right over rust — and penetrates rust particles to protect surfaces from further rusting.

It can be applied by brush, spray or dip (it ordinarily requires thinning for spray application). One application is usually sufficient.

Available clear or in colors — red, aluminum, green, light gray and black — the material has a natural affinity to metal surface beneath the rust.

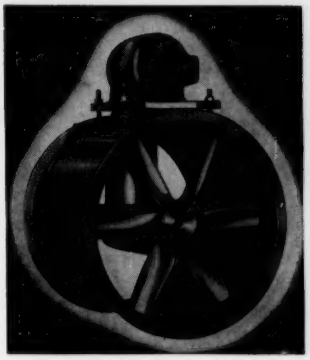
("Rust-Cure" is manufactured by The Monroe Company, Inc., Dept. P&PSE, 10703 Quebec Ave., Cleveland 6, Ohio.)
Circle 9170 inside back cover.

Speed is adjustable on belt-driven duct fans

Variable-pitch drives which permit quick and easy adjustment of fan speed — and of fan noise level and air volume — are standard equipment on redesigned line of belt-drive duct fans.

Simple adjustment of the driver sheave on these new fans will slow the fan down to reduce air deliveries by up to 1/3 where maximum catalog performance is not required.

Complete standardization of components within each fan size means that a change of



Each fan size has standardized components

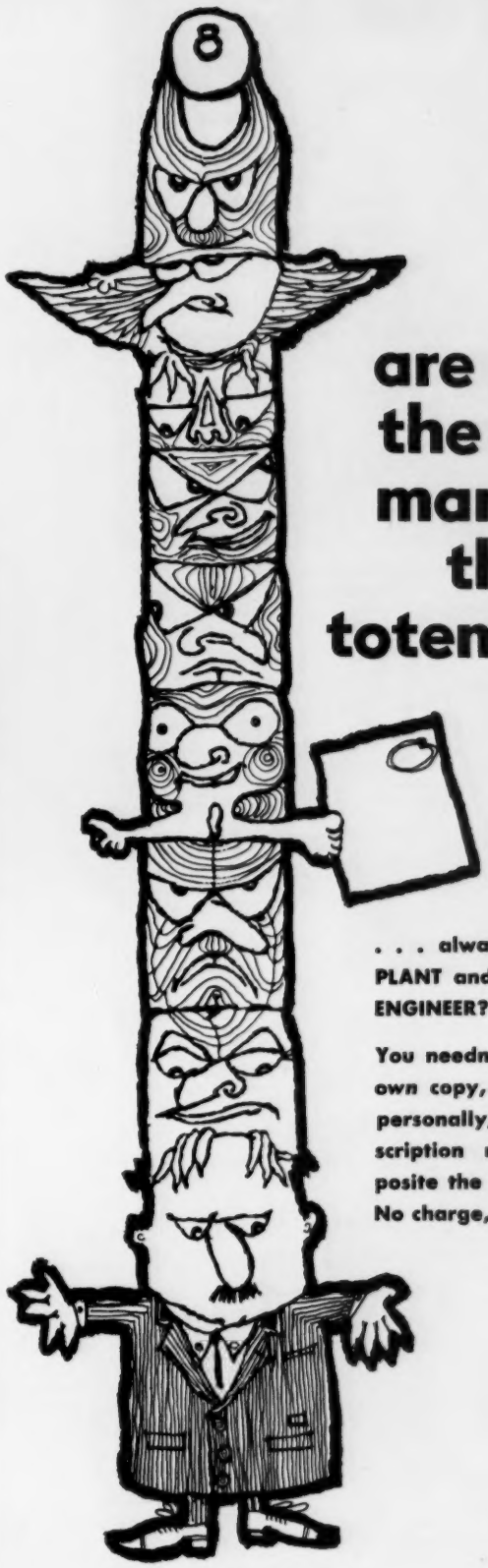
motors, to meet changing air delivery needs, requires no modification of the fan and can be made while fan is still in place in the duct work.

Because all belt-driven fans of the same diameter now use the same duct, bearing cover, assembly base, shaft and bearings, any fan of a given size can be converted to any other fan of the same size by substituting motor, drive and, in some cases, the propeller.

Bearings and shaft on all fans are furnished for the maximum load any model in that size would produce.

Thus, a fan which is no longer needed for its original application can be converted to handle another job.

(Belt-drive duct fans are manufactured by Hartzell Propeller Fan Company, Department P&PSE, Piqua, Ohio.)
Circle 9171 inside back cover.

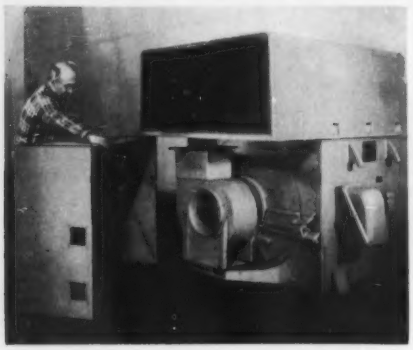


are you the low man on the totem-pole

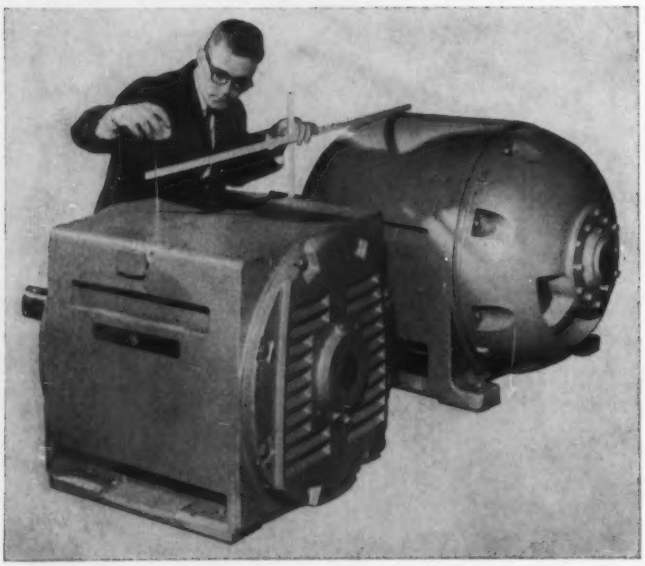
. . . always last to receive PLANT and POWER SERVICES ENGINEER?

You needn't be. To get your own copy, addressed to you personally, fill out the subscription request form opposite the inside front cover. No charge, of course.

In the medium-size motor line, the design has gone "square." This shape offers comparatively smaller size per rating with up to 75% greater air through the motor



Totally enclosed motor is forced-air cooled with better heat transfer. Tubes are located in the top, and the motor can be easily disassembled by one man for maintenance



Typical size reduction afforded by the square design is shown by this comparison of old and new 150-hp motors

Complete AC motor line gets

- ***medium-size motors go "square"***
- ***boiler feed pump motors have lower noise levels***
- ***totally enclosed motor with improved air cooling***
- ***silicone rubber insulation***

A number of new features have been incorporated in a recently completed redesigned line of GE random- and form-wound motors—ranging from one to 5000 hp.

Of particular importance is the use of silicone rubber insulation on all models. In the form-wound motors, the insulation consists of silicone rubber-impregnated dacron and glass tape wrapped around each coil in several layers. This combination has improved the mechanical strength of the insulation by some 300 percent, yet takes advantage of the high dielectric and sealing properties of silicone rubber.

Random-wound motors make use of a liquid silicone rubber which completely seals the windings against moisture, dirt or corrosive materials, but still allows good heat transfer from the end turns to the ventilating air. The insulation is flexible over a temperature range of −40°C to +200°C.

Medium size goes square

The medium-size motor line with ratings from 100 to 600 hp has acquired a "square look." Besides keeping pace with modern trends in appearance, the square design offers a better enclosure with 22 to 45% savings in floor space and easier accessibility for maintenance.

Installation is simplified by an enlarged conduit box, and by lifting lugs integrally cast into the motor frame. The cast iron flat end-shields — 70 percent lighter in weight — can be handled by one man.

Low operating noise level is result of air intake, fan and punchings design.

(More information on the "Custom 8000" motors may be obtained from General Electric Company, Dept. P&PSE, Schenectady 5, N.Y.)
Check 9172 inside back cover.

Totally enclosed line is better cooled

Available in ratings from 250 to 5000 hp, totally enclosed motors feature a top section containing multiple tubes through which outside air is forced by a blower mounted on motor shaft.

Air inside the totally enclosed designs is circulated over the tubes and cooled by heat transfer. Air is passed through the cooling tubes at a rate of over 2000 ft per minute by the blower.

The removable end shields are light enough to be handled by one man and facilitate rotor and winding inspection without disturbing alignment. Easy removal of ventilation blower assembly, located at the opposite-shaft end, is also provided.

Rigid-end shield supports with split-bearing design permit easy inspection and replacement of sleeve bearings without disturbing alignment. Use of dowel pins on the end shields assure accurate shaft and air-gap realignment when the rotor must be removed.

(Totally enclosed motor is product of General Electric

NEW LOOK

Company, Dept. P&PSE, Schenectady 5, N. Y.)
Circle 9173 inside back cover.

Feed pump motors have lower noise levels

As part of the "new look" line of AC motors, line of redesigned boiler feed pump motors is available in either dripproof or weather protected enclosures with horsepower ranging from 800 to 7000.

Other improvements in the large two-pole motor line include better ventilation and lower noise levels (resulting from complete redesign of air flow system). The motor can be disassembled for inspection by one man using a wrench in five minutes.

All ventilation openings have been moved to the top section to keep them away from accumulations of snow, dirt or trash.

Bearing system has an "air-lock" feature — air pressure from the internal fan is forced into the bearings providing a positive pressure to prevent loss of lubricant.

The rotor design provides for a tight lamination stack and allows for thermal expansion of the cage resulting from temperature changes due to acceleration and load cycling.

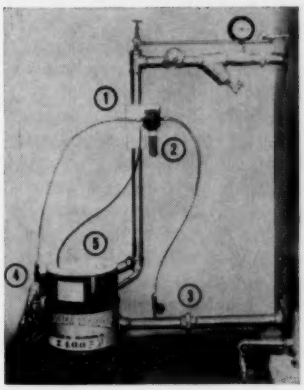
(More information on boiler feed pump motors is available from General Electric Company, Medium AC Motor and Generator Dept., Dept. P&PSE, Schenectady 5, N.Y.)
Circle 9174 inside back cover.

Takes complete care of air conditioning water treatment

Controlled feeding system provides continuous, automatic proportioning of liquid chemicals in the treatment of cooling tower water to prevent corrosion and scale formation.

Eliminating the need for daily charging of chemicals, the feeder supplies as little as 1/10 to 1 gal of specially filtered liquid chemical into the circulating water every 24 hours. One or two 55-gal drums of chemical can last a season under normal conditions with little or no personal attention.

Easy to install and control, the feeder has no moving parts and no valving to set.



Its operation is as such (see above): Aspirator chemical feeder (1) with differential pressure regulator maintains a constant pressure drop across a porous stone (2) that acts as a rate valve. Feeder is connected by plastic tubing to the suction (3) and discharge (4) lines of the cooling tower circulating pump. Differential pressure creates a vacuum that induces the chemical to flow from supply drum (5) through porous stone rate valve.

Flow rate through the stone depends on the depth of its immersion in the transparent bowl. A simple pushbutton control allows air to enter or escape and thus regulates chemical level in the bowl. Once set, it can be forgotten.

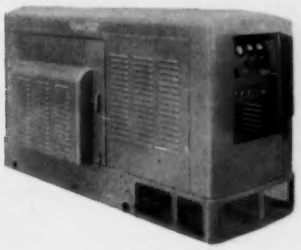
Ideal for cooling towers of 10 to 400 tons capacity in normal operation, the unit eliminates chemical waste and operates only when cooling tower is in operation. Other equipment is available for larger size towers.

(Micro-feeder is product of Bird-Archer Company, Dept. P&PSE, 4337 N. American St., Philadelphia 40, Pa.)
Circle 9175 inside back cover.

Emergency electric plant is gasoline-driven, supplies 50,000 watts

Providing fast motor starting and full-rated electric power for all types of standby emergency application, series of 50,000-watt, gasoline-driven, emergency electric plants come equipped with newly developed generator.

Equipped with all-weather metal housings, the plants are



Emergency electric plant has all-weather metal housing

practical for primary power applications such as floodlighting and in the construction field where rugged day-in, day-out operation is essential.

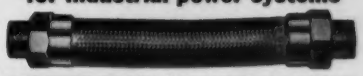
Generator provides step-up performance by faster voltage recovery — up to five times faster than a rotating exciter.

All units are complete plants with an International Harvester UV-401, V-8 engine, generator and control panel assembled into one compact unit. Units are rated 50 kw, 62.5 kva at 0.8 power factor and are available in all standard voltages to 600 volts.

(Series KB electric plants are manufactured by D. W. Onan & Sons, Inc., Dept. P&PSE, 2515 University Ave., SE Minneapolis 14, Minn.)
Circle 9176 inside back cover.

COBRA FLEXIBLE
SEAMLESS METAL HOSE

Custom constructed assemblies for industrial power systems



All sizes in bronze, stainless or carbon steel, monel, inconel and low carbon nickel. Seamless spiral or parallel corrugation... Braided. All type of fittings and flanges welded, brazed or soldered. Also, interlocked hose.

write — wire — phone: RE 7-3311
...for prices and catalogs

COBRA METAL HOSE
5059 S. Kedzie Ave. • Chicago 32, Ill.
Circle 9177 inside back cover.

BOILER MAINTENANCE MEN!
Protect Yourself and Your Clothes with a
SETLOW
UNION MADE
HOODED COVERALL
ORDER BY MAIL
ONLY $7.50 Each POSTPAID
Send Check or Money Order. Open Account to Rated Concerns.

Completely covers from head to foot. Hood is held securely by tie string at neck. Adjustable wrists and ankles also keep out soot. Sanforized* washable heavy blue denim with 2-way zipper front. Reinforced front-piece for crawling protects garment and zipper front from wear. Have reinforced, double knees and elbows. Send chest size (under arms, over chest at broadest point), height and weight. *(Shrinkage less than 1%).

Write To Dept. 7 for Free Illustrated Folder
M. SETLOW & SON, INC.,
Quality Since 1896
137 CHESTNUT ST., NEW HAVEN, CONN
Circle 9178 inside back cover.

How to build salt storage basins with better liquid level control

H. A. COUNTRYMAN, Editor
with D. M. HEATH, Brine Engineer
Morton Salt Company

As ion-exchange water softening plants increase in number and scope of application, improved methods of storing and handling the salt must be developed. If the tonnage requirements warrant the initial investment, a wet salt storage basin should be used. Economical bulk deliveries of salt can be made either by rail or truck. With proper design handling costs can be kept at a minimum.

A typical wet salt storage basin is made of concrete, and constructed so the loading hatches are at the best elevation to facilitate minimum handling during a salt delivery. Choice of bulk truck, box car, or hopper car delivery should be made in the original plans, selecting whichever is the most economical.

A wet salt basin serves as both a dissolver and a method of storage. It must be designed with the proper brine collector system in the bottom of the basin. There are several methods of constructing this collector, but a very satisfactory and inexpensive collector can be made from porous-wall cement pipe.

Two or three runs of porous wall pipe should be laid the length of the basin and plugged at one end. The other ends should be manifolded together with non-corrosive plastic pipe to form a suction on the line to the brine handling equipment.

If the recommended salt is granulated, which is a refined salt and is 100 percent soluble, then the wet storage basin should be equipped with a gravel support bed. This should be a washed and graded filter gravel; 8″ layer ½″ to ¾″, 4″ layer ¼″ to ½″, and a 4″ top layer of ⅛″ to ¼″. The gravel bed should be level and cover the entire bottom of the basin.

The fresh water inlet line should form a distributor loop around the top of the basin. The end should be capped and the run of pipe should be drilled with ⅛″ diameter holes on approximately 9″ centers with the holes facing toward the center of the basin. This will provide the proper fresh water distribution, avoiding the chance of channeling through the salt bed.

When the recommended grade is Rock salt, there must be consideration given to periodically cleaning the basin. This is generally done by constructing dual basins, so that one side can be cleaned without interrupting the supply of brine.

In a wet salt storage basin the liquid level should always cover the salt bed. To avoid the problems of valve corrosion and basin overflow a system has been developed to provide more efficient level control. A typical assembly includes the following equipment: automatic reset timer, solenoid valve, flow controller and strainer. The liquid control parts are installed on the water supply line to the salt basin, while the automatic reset timer is mounted nearby, or with other electrical controls.

The timer is started by any electrical signal that indicates the use of a given quantity of brine. This signal source can be the brine pump motor starter, float switch of a measuring tank, contacts of a brine meter, or the program control of an automatic softener. When the signal circuit is completed, the timer clock starts and the solenoid valve is energized for a pre-set period of time. While the solenoid is open, water flows to the storage basin through the flow controller at a fixed flow rate. By adjusting the timer setting, any desired quantity of water can be returned to the storage basin.

When this control system is properly adjusted, the liquid level in the salt storage basin will follow the salt bed down, and maintain a predetermined liquid head above the salt. This feature automatically provides the necessary volume to prevent an overflow when a shipment of salt is unloaded.

The system automatically maintains the liquid level in a wet salt basin without any additional controls. It makes possible the full automation of a water treatment installation. Since it is normally located within the plant with other allied equipment, there is no corrosion problem as when controls are installed in the salt basin.

When properly adjusted, the system provides an easy method of checking the salt inventory, because the liquid level is always in proportion to the remaining salt. The brine pump cannot be damaged by running the basin dry. Controls can be located within a heated building and freezing problems are eliminated.

(Levetrol system is a development of the Industrial Division, Morton Salt Company, Dept. P&PSE, 110 North Wacker Drive, Chicago 6, Ill.) Circle 9179 inside back cover.

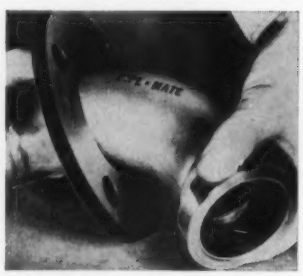
For thin-wall pipe, thin-wall stainless fittings

A line of light-wall stainless steel fittings and flanges have been designed for nominal-temperature, low-pressure, non-critical piping.

The fittings are available in ½″ through 4″ sizes, Schedule 5S and 10S, in stainless steel grades best suited to corrosive applications in the range of 150 psi or less.

In addition to providing lower-cost fittings for non-critical applications, the line features long tangents that permit easy alignment of fittings and pipe and allow clearance for fabrication of completely flanged elbows, returns, tees and crosses.

The line features a swivel insert flange especially designed for ease of alignment. It is a carbon steel flange, and it has a stainless steel insert at the bore into which pipe or fitting can be expanded. The carbon steel portion is simply rotated to line up the bolt holes and tightened. No welding is involved.



Swivel flange and long tangents are features of line of light-wall stainless steel fittings and flanges

Another feature is a reversible fitting. Butt-welded in regular position, it is a cap. Reversed, it can be easily fillet-welded to act as a plug or pipe closure.

The fittings can be butt-welded in the normal manner, or, with use of an alignment connector or sleeve, they can be fillet welded or brazed. Where flanged connections are desired, the pipe or fittings are simply expanded into the bore of the flange insert, and no welding is required.

Expanders and alignment connectors are both included in the line, in addition to 45° and 90° elbows, returns, eccentric and concentric reducers, tees, reducing tees, caps, stub ends, flared nipples and flanges.

(Pipe-Mate line is manufactured by Tube Turns, Division of Chemetron Corporation, Dept. P&PSE, 222 East Broadway, Louisville 1, Ky.) Circle 9180 inside back cover.

Keeps oil level constant where it can be seen

Rugged device automatically maintains oil in a bearing at a constant level and incorporates a sight in the base of the oiler offering the operator a visual means of observing this level at any time.

This added feature of visual check of the oil level assures that an accurate level is being maintained. The oiler is applicable to large machinery where bearing failures cannot be tolerated.

Sight in base permits visual inspection of constant oil level

Units are furnished with ½" pipe thread on the side and bottom outlet. Either outlet can be used. The other may serve as a drain.

The oiler can be conveniently filled through a top filler cap, making it easy to replenish the oil supply. A shut-off holds the oil supply in the reservoir when the filler cap is removed.

A large air intake with ⅛" female pipe thread allows an air filter to be readily inserted. The air intake can also be piped into the top of a bearing housing to equalize any pressure differential. Surge extension adaptors can also be screwed into the air intake to increase the surge level of the oiler.

(Style CS oiler is manufactured by Oil-Rite Corporation, Dept. P&PSE, 2396 Waldo Blvd., Manitowoc, Wisconsin.)
Circle 9181 inside back cover.

How loud the sound? Pocket size meter tells how much

Weighing only 12 oz and not much larger than an electric shaver, noise survey meter monitors and measures noise hazards.

Designed for rapid, multi-location measurement of sound levels, the meter can be used to establish noise contour-maps in large industrial plants. It is housed in plastic with a leather, zippered carrying case and neck cord.

In conjunction with the "Soundscope", a precision instrument which can accurately measure the energy distribution of sound within a narrow frequency band, complete noise analysis can be achieved. The meter can be used either ahead of the "Soundscope", as a means of locating areas requiring detailed study; or behind the "Soundscope", as a monitor of noise levels in areas where frequency characteristics already have been determined.

Small meter can be used to establish noise contour maps

In making sound measurements, the meter is pointed toward the noise source, energized by power from a small, long-life mercury battery, and adjusted to an "on-scale" reading by means of a single thumb-wheel attenuator.

Sound pressure levels can be read quickly in the range of 75 to 140 decibels. This range covers roughly the noise levels produced by busy street corner traffic up to that in the test cell of an aircraft engine plant.

Two models are available. The first, called the Industrial Hygiene Model, has been designed with frequency response characteristics based on hearing damage criteria. The second is intended for use in noise reduction studies and acoustical engineering surveys, and has a "flat" response.

(Noise survey meter is manufactured by Mine Safety Appliances Company, Dept. P&PSE, Pittsburgh, Pa.)
Circle 9182 inside back cover.

Get a sure grip with plastic coated gloves

Series of plastic-coated gloves are particularly recommended for operations where sure grip is needed in handling greasy, oily or other slippery objects.

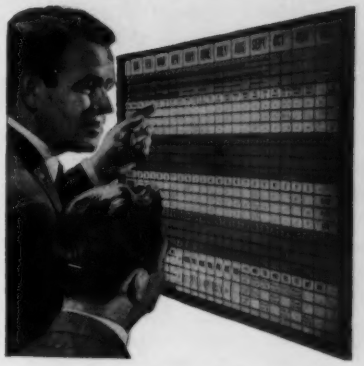
Coated with a blend of plastic resins and plasticizers, gloves are abrasion resistant, flexible, and long wearing. In addition, they are completely liquid-proof.

The series comes in 6 models and includes choice of full or partial coatings. There are no seams across knuckles or other areas to irritate hands. Wing thumb, fingers and palm are curved to form natural contours.

Gloves come in knitwrist, band top or gauntlet styles in various lengths. All gloves have an 8-oz jersey lining.

(Plastic-coated gloves are manufactured by American Optical Co., Safety Products Div., Dept. P&PSE, Southbridge, Mass.)
Circle 9183 inside back cover.

You Get Things Done With Boardmaster Visual Control

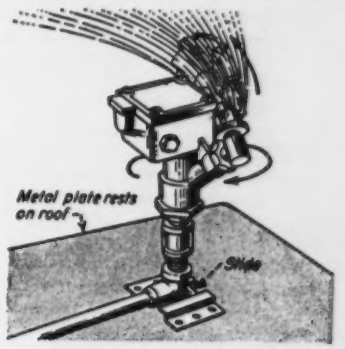


★ Gives Graphic Picture of Your Operations —Spotlighted by Color
★ Facts at a glance — Saves Time, Saves Money, Prevents Errors
★ Simple to operate — Type or Write on Cards, Snap in Grooves
★ Ideal for Production, Traffic, Inventory, Scheduling, Sales, Etc.
★ Made of Metal. Compact and Attractive. Over 350,000 in Use

Complete price $49.50 including cards

FREE 24-PAGE BOOKLET NO. P-10 Without Obligation

Write for Your Copy Today
GRAPHIC SYSTEMS
55 West 42nd Street • New York 36, N.Y.
Circle 9184 inside back cover.



COOL any building from the ROOF

Everyone knows how the sun, beating down on the roof of a building, descends into the interior. It makes the occupants uncomfortable and ruins merchandise.
Roof cooling is the answer. It can be used on any roof to keep the building cool or to save air conditioning costs. Best equipment for the job is Ruppright's Rotary Roof Cooler. Easily installed, it produces a thin film of water on the roof. This film evaporates but is continuously renewed by the slowly-rotating cooler making the roof cooler than the air.

INSTALLED WITHIN A FEW HOURS

RUPPRIGHT'S ROTARY ROOF COOLER
P.O. Box 43555 pi, Los Angeles 43, Calif.
Circle 9273 inside back cover.

Cabinet dust collector has high efficiency

Overall efficiency of cabinet dust collector is said to be in excess of 99.9 percent by weight, even with high concentration of particles smaller than 1 micron. High filtering efficiency permits filtered air to be recirculated indoors thus saving heated or conditioned air.

Dust-laden air is brought into cabinet and dust is trapped on outer and under sides of fire-resistant filter bags. Possibility of fan loading or damage is eliminated since blower is located on the clean air side of the collector.

Most dust settles immediately into the drawer. Any clinging dust is easily dislodged by filter shaker operated from outside cabinet.

Unit contains a pull-out drawer with 5.5 cubic feet capacity. Equipped with hopper base, dust capacity is 9 cubic feet.

Collectors are powered by a three-horsepower motor. Cabinet stands 76-inches high and occupies 40 x 36 inches of floor space. Total cloth filtering area is 250 sq ft.

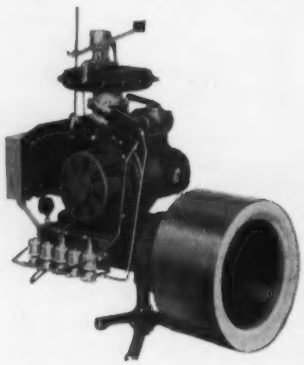
(Cabinet dust collector is manufactured by Torit Mfg. Co., Dept. P&PSE, Walnut & Exchange Sts., St. Paul, Minnesota.)
Circle 9185 inside back cover.

Gas-oil burner handles scotch marine boiler back pressure

Common problems of firing scotch marine boilers including pulsation, high-combustion chamber loading, etc., are virtually eliminated by burner. Unit also maintains excellent CO_2 levels and stack temperatures below previously attainable minimum.

Burner is single port nozzle mixing type and comes completely wired, assembled, and factory-tested prior to shipment. Five standard models of burners are included in line, ranging in capacity from 1 to 5 million Btu.

Straight gas, straight oil, or gas-oil combination burners are available in all five basic models. Gas dual-fuel burners are also available.



Combination gas-oil burner for scotch marine boiler applications with possible back pressure or known furnace pressure

All combustion air for gas firing is supplied by low-pressure, nonoverloading squirrel cage blower. Main gas valve is of the slow-opening diaphragm type operated by an electrical solenoid pilot providing low-fire start for on-off operation only.

When oil is used as fuel, oil pump is a two-stage, self-purging type with automatic pressure relief and bypass valve within pump housing.

Relay system insures flame failure protection in all burners.

(Gas-oil burner is manufactured by The Mettler Company, Inc., Division of Eclipse Fuel Engineering Co., Dept. P&PSE, 1101 Buchanan St., Rockford, Ill.)
Circle 9186 inside back cover.

Aluminum jacketing elbows are easy to install

Aluminum elbows for insulated piping have patented humped design that automatically compensates for pipe expansion and contraction, and for differences in radii that vary with pipe sizes and insulation thickness.

Only 13 interchangeable sizes will fit 109 combinations of pipe sizes and insulation thicknesses ranging from 3" OD through 12.81" OD.

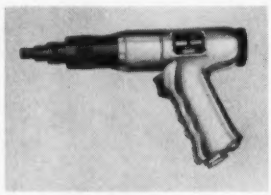
Elbow halves can be quickly clamped with two metal bands. Installation time is said to be 5 minutes or less, with no cutting away of insulation material to fit the elbow.

Elbows take the place of cements, mastic weatherproofing, chicken wire, canvas and paint, which require expensive hand labor applications.

Heavy gauge aluminum elbows are easy to fit and install

Humped elbows are two-piece, heavy gauge. Surfaces inside and out are smooth, free from wrinkles and metal folds, and designed to fit either long or short radius ells.

(Aluminum elbows are manufactured by General Aluminum Supply Corp., Dept. P&PSE, 1506 Eastern Ave., Kansas City, Mo.)
Circle 9187 inside back cover.



Reversible pneumatic screwdriver . . .

. . . features pistol grip handle with trigger throttle. Available in four speeds, all models are furnished with either adjustable clutch, positive clutch, or direct drive.

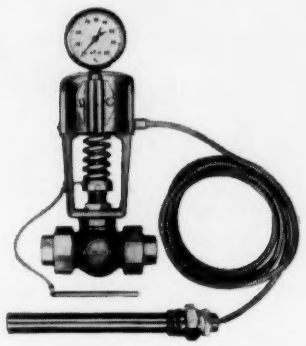
The air motor delivers plenty of drive at recommended working air pressure of 90-100 psi.

(Reversible pneumatic screwdrivers are manufactured by Airetool Manufacturing Co., Dept. P&PSE, 328 S. Center St., Springfield, Ohio.)
Check 9188 on Reader Service Card.

Temp regulator starts corrective action within 1/10°F

Self-operated temperature regulator controls temperature through the throttling action of its valve on a steam or water line. Responding instantly and powerfully to temperature change, the regulator begins corrective action with less than 1/10 of a degree change in temperature at the bulb.

With the valve stem sealed by a friction-free bellows, the packless valve does away with stem binding and requires no lubrication. Without "braking" friction and with little spring tension to overcome, the slightest temperature variation results in positive resolution of stem.



Regulator will start response to less than 1/10° change

An internal safety spring protects the regulator against damage from accidental overheating. Stainless steel seats and discs are designed with disc guides entirely outside the path of steam flow to eliminate wire drawing.

Both the indicating model, with an adjustable dial thermometer, and the non-indicating unit are available in sizes from ½" to 2".

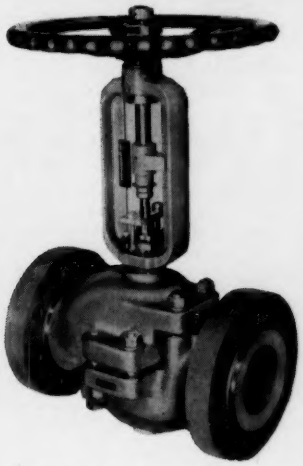
Temperature ranges from −15°F/50°F to 240°F/350°F. Bronze, stainless steel and plastic coated systems are available.

(American Temperature Regulator is manufactured by Manning, Maxwell & Moore, Inc., Dept. P&PSE, Stratford, Connecticut.)
Circle 9189 inside back cover.

Control valve handles hard-to-handle fluids

Line of handwheel-operated control valves features a single-seated valve body with extra thick body walls cast to 600 lb ASA rating.

Available in ductile iron, steel, bronze, and many alloys,



Control is accomplished by vernier indicator, long stroke, and oversize handwheel

it is suited to solve corrosion and erosion problems encountered when using "hard-to-handle" fluids.

Tight shut-off is assured through use of special seat materials such as Teflon. Complete range of sizes — ¾" through 6" — is available with separable or integral flanges.

Micro-flow control is accomplished by combination of a vernier position indicator, long stroke, and an oversized handwheel. Other features include a fully guided throttle plug for positive alignment, and a "lift-out" seat ring.

Split valve body allows quick disassembly.

Should fully automatic or remote manual operation be desired, the valve can easily be converted in the field by mounting a pneumatic cylinder or spring and diaphragm actuator.

(Series LM manual control valve is product of Dept. D-7, Conoflow Corporation, Dept. P&PSE, 2100 Arch St., Philadelphia 3, Pa.)

Circle 9190 inside back cover.

Just pull the trigger to put out fires

Two pressurized wet chemical, portable fire extinguishers stress simplified, self-evident operation — simply aim the discharge nozzle at the fire and pull the trigger. There is no trigger-locking pin to remove, no valve to turn, no inverting, and no bumping.

The two units are a 2½-gal water and a 2½-gal loaded stream portable.

Other features include: center-balanced for easier carrying, and rugged pressure gages recessed in handle.

Wet chemical extinguisher does not have to be inverted to operate

Water unit is suitable for use on fires in ordinary combustibles such as wood, paper, or cloth, while the loaded stream extinguisher can be used on either ordinary combustible or flammable liquid fires.

(Wet chemical extinguishers are manufactured by Walter Kidde & Company, Inc., Dept. P&PSE, 675 Main Street, Belleville 9, N.J.)

Circle 9191 inside back cover.

Gives watertight seals around conduits passing through walls, floors

A group of five different types of wall and floor entrance fittings provides watertight seals around conduit or cables as they pass through foundations, floors, or walls of buildings.

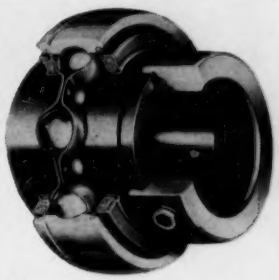
The fittings are available for use with threaded or unthreaded steel conduit, fiber or Transite conduit, or with exposed cables.

They will accommodate conduit ranging from ¾" to 6" or cables of varying number and sizes. The conduit, or cable, enters through a gland-type sealing assembly which may be tightened at any time by means of a pressure bushing, to eliminate leaks if they should develop.

Types available include: conduit wall entrance seal, cable wall entrance seal, cable floor and wall entrance seal, conduit floor and wall entrance seal, and one for sealing cables entering in Transite, fiber or unthreaded steel conduit.

(Wall & floor entrance fittings are manufactured by O.Z. Electrical Manufacturing Co., Inc., Dept. P&PSE, Brooklyn 17, N.Y.)

Circle 9192 inside back cover.



Eccentric collar lock . . .

. . . machine unit, ball bearings are equipped either with spherical seat for automatic self-alignment or straight outer diameters for more rigid, accurate shaft location. Collar which secures unit to shaft is a self-tightening, eccentric type that provides easy and positive locking upon installation. Bearings are offered either sealed for life or with lubricant channels in the outer bearing to provide for relubrication.

(Machine unit ball bearings are manufactured by Hoover Ball and Bearing Co., Dept. P&PSE, 5400 South State Rd., Ann Arbor, Mich.)

Circle 9193 on Reader Service Card inside back cover.

Submersible motor has highest hp for size

Four-inch submersible motor is designed to drive deep well turbine pumps in industrial water supply applications. The motor provides highest horsepower capacity in a motor of that diameter.

Ratings offered in single-phase construction are from 1½ to 5 hp. In three-phase construction, ratings are from 1½ to 7½ hp at 3550 rpm.

Large horsepower capacity is achieved by using an outside wound stator. This construction permits more effective use of copper and iron for higher efficiency and torques. The motor stator is protected by a high-dielectric insulation system, by encapsulation in a chemically inert plastisol, and by sealing in stainless steel. Shaft height of the motor can be adjusted to center pump impellers for optimum pump efficiency. Design of adjusting mechanism prevents over-adjustment that could damage the motor. Another feature incorporates a self-equalizing thrust bearing with a carbon thrust pad and six self-aligning hardened, stainless steel tilting shoes, mounted on a spherical seat. Its design insures reserve-thrust capacity and long bearing life.

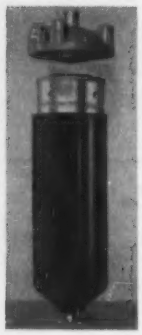
For complete corrosion resistance, bearing brackets are of cast iron, the thrust bearing is stainless steel, and all other exposed parts are either stainless steel, brass or neoprene.

(Submersible motor is manufactured by Louis Allis Co., Dept. P&PSE, Milwaukee 1, Wis.)

Circle 9194 inside back cover.

Removes oil, moisture from compressed air by separation

Compressed-air filter removes moisture, oil and contamination by separation rather than by absorption.



The filter uses a replaceable cartridge with a specially treated pleated paper media. End caps are resin-treated hard paper with cork gaskets firmly cemented to each end. Cartridge has corrugated center tube. Pressure drop across filter is low.

Easily installed, the filter may be used in air lines with pressures to 125 psig. They are rated at 20 standard cfm. Accumulated water and oil can be drained off periodically.

(Compressed air filter is manufactured by Fram Corporation, Dept. P&PSE, Providence 16, R.I.)
Circle 9195 inside back cover.

Determines location, depth of pipes and cables

Transistorized instrument runs on flashlight batteries

For determining location and depth of pipes, valves, cables or any metallic object, transistorized locator features single-turn transmitting and receiving coil cast right into fiberglass case.

Transmitter and receiver are powered by four flashlight batteries each, with an average life of 1400 hours. The instrument uses a total of 10 transistors, three in the transmitter and seven in the receiver.

Transmitter has a switch to allow for good and poor conductive ground, and the receiver has a 3-position sensitivity switch plus a variable gain control. Both have a built-in battery tester.

Adjustable-height drop-handle allows for men of different height.

(Pipe, valve and cable locator is manufactured by Gardiner Electronics Co., Dept. P&PSE, 2545 E. Indian School Rd., Phoenix, Ariz.)
Circle 9196 inside back cover.

Measures small amounts of AC, DC to 20 amps in conductors

No need to break circuit or insulation

By clamping tongs around the electrical conductor, small amounts of current — in one-half ampere divisions from 0 to 20 amps — can be measured with portable device. There is no need to break the circuit or insulation.

The jaws can accommodate conductors up to ½ inch diameter. Two ranges are provided on one dial — 10-0-10 amps for DC only and 0-20 amps for both AC and DC.

Instrument's jaws are clamped around conductor for measuring current

The 10-0-10 DC scale utilizes an "electrical zero" which is established by use of a magnetic source attached to the instrument.

(Type PB Tong Test Ammeter is manufactured by Columbia Electric Mfg. Co., Dept. P&PSE, 4519 Hamilton Ave., Cleveland 14, Ohio.)
Circle 9197 inside back cover.

Pyrex lens for lighting requires 6" depth; gives more light

Designed for use with incandescent lamps from vertical to horizontal mountings, Pyrex lens with satin reflector make up optical system to give shallower lighting fixtures. In the case of horizontal mountings, fixture depth can be limited to six inches.

The lens has an optically engineered prismatic pattern which produces extra wide-angle illumination. This allows unit spacings of 1 to 1¼ times the mounting height above the working plane.

Both round and square designs are available.

The square lens produces added light diagonally across the corner of the lens, fully illuminating the area between units. The round lens is available with enameled risers which provide added brightness control as well as color tones.

Four square-shaped sizes are available — from 7⅞ to 11⅞ inches square. The round lenses are available with diameters of 8⅜ or 11¼ inches.

(Concave Shallo-Lens is development of Corning Glass Works, Dept. P&PSE, Corning, N.Y.)
Circle 9198 inside back cover.

Provides automatic two position control action

Providing accurate, automatic control of operations suitable for two-position control action, controller can be used with any transducer generating a DC signal, such as thermocouples, tachometer generators, load cells, etc.

Corrective action occurs almost simultaneosuly with detection of any input signal deviation. The instrument is sensitive enough to react to a change of one microvolt.

Calibration accuracy is within ±0.25% of full scale span or 5 microvolts. Ranges are available from 1 to 100 microvolts.

The controller also includes a high-gain control amplifier that combines stability with extreme sensitivity and provides a highly favorable ratio of signal amplification to component electrical noise suppression.

Red and green signal lights on the instrument door indicate conditions and are visible from a great distance.

A built-in safety control action causes the control relay to shut off immediately when failure of any system component occurs.

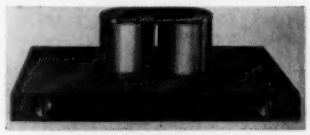
Constructed to withstand all types of vibration and mechanical shock, the device occupies 56 square inches of panel space.

(Signaling controller is manufactured by Thermo Electric Co., Inc., Dept. P&PSE, Saddle Brook, N.J.)
Circle 9199 inside back cover.

For thermoelectric cooling, heating, power generation

Each unit will produce ¼ watt of power

Thermoelectric junction is designed for applications where it is desired to maintain a temperature which is either above or below the ambient, where relatively low heat input or extraction is involved.



Thermoelectric junction uses bismuth telluride alloys in crystalline form

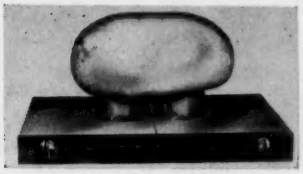
In normal room ambients, with an input power of two watts, it is possible to obtain a temperature difference in excess of 40°C. With no external heat load, the cold junction temperature is −15°C.

For generation purposes, an output power of approximately ¼ watt can be obtained from each unit with a temperature difference of 150°F.

Special arrays of the units

may be used to provide a large power output in generator applications.

The semiconductor material



Frosted cell is being used as a peltier cooler. Cold junction temperature is −35°C with input of 2 watts

consists of bismuth telluride alloys in crystalline form.

(TA-11 thermoelectric junction is development of Ohio Semiconductors, Inc., Dept. P&PSE, 1035 W. Third Ave., Columbus 8, Ohio.)
Circle 9200 inside back cover.

Plastic safety hat has built-in comfort

Molded high-impact plastic safety helmet with adjustable all-plastic suspension comes in gray, white or yellow.

Helmet's features include a suspension that can be adjusted exactly to head sizes from 6⅝" to 7¾". The suspension comes in two parts, both of which are replaceable. The

Suspension can be adjusted exactly to head sizes

detachable sweatband is also replaceable.

Comfort is achieved with a headband that fits the back of the head snugly, preventing the hat from falling or blowing off.

(Plastic safety hat is product of Davis Emergency Equipment Company, Dept. P&PSE, 45 Halleck St., Newark, N.J.)
Circle 9201 inside back cover.

Tells when low level is reached

An explosion proof, hermetically sealed, low-level warning switch is designed for use in almost any liquid. Design does not allow it to be affected by contaminants in the fluid.

The switch can be installed to warning lights and/or au-

Explosion-proof warning switch is designed for almost any liquid

tomatic switching mechanisms to start pumps or open auxiliary lines.

The device is unaffected by rolling or pitching motions — a time lag mechanism prevents tripping even when upside down for less than 3 seconds.

Meeting military specification, the switch weighs less than 16 oz. It operates on any electrical system from flashlight battery to 300 v at 5 amps, in temperatures from −65° to +250°F.

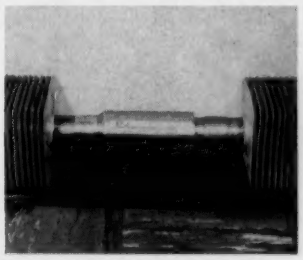
(Low-level warning switch is product of Divac Division of Acme Machine Works, Dept. P&PSE, 13025 Cerise, Hawthorne, Calif.)
Circle 9202 inside back cover.

Copper expansion joints for hot water heating, refrigeration

A line of copper sweat-fitting expansion joints has been introduced for use with hot water heating and refrigeration systems.

The joints have a temperature range from −30°F to +240°F. They have a full two inches of axial expansion and full 360° rotation.

The seal is a spring-seated Buna wedge seal or a copper



Sweat-fitting expansion joints contain no metal working parts

ball seat permitting flexibility for alignment. All parts are non-corrosive.

Containing no metal working parts, the joints are effective in dampening pipe noises and controlling thermal expansion and contraction.

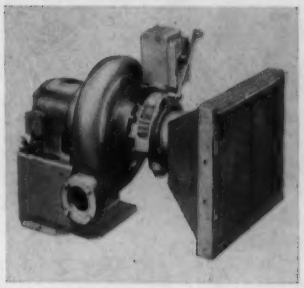
Range of sizes are available with ¾" to 2" copper tube connections.

(Sweat-fitting expansion joints are manufactured by Rotherm Engineering Company, Inc., Dept. P&PSE, 7280 W. Devon Ave., Chicago 31, Ill.)
Circle 9203 inside back cover.

Gives more protection in gas combustion systems

Line of air-gas premixers and centrifugal pressure blowers used in gas and oil combustion systems come equipped with recently developed air filters which provide increased protection for the combustion system.

By protecting against foreign material entering the system, the filters prevent changes in critical gas-air mixtures, eliminate plugging of burner ports and overcome rapid equipment wear.

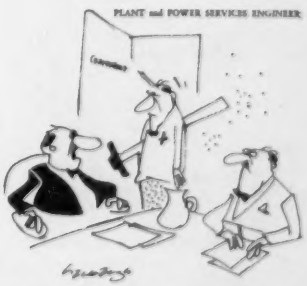


Standard, dry, disposable filters have been added to gas and oil combustion systems

Filter units are available in single- or double-element styles. The air requirements of the system determine the style used. Elements are the readily available, standard dry disposable type, and can be changed in a matter of seconds through a simple snap-in arrangement.

Premixers and blowers can be ordered from the factory with filters installed. Those of the manufacturer already in the field can be easily adapted. Field modification kits are available complete with all mounting hardware.

(Unimix machines and blowers are manufactured by Eclipse Fuel Engineering Company, Dept. P&PSE, Rockford, Ill.)
Circle 9204 inside back cover.



"Wilson, we've called you in because we're out of cigarettes . . ."

NEW LITERATURE

for effective plant and power services operation

Reviews of books and industrial bulletins describing equipment, supplies, services

Describes packaged unit substations

Basic design, application and specification information on packaged unit substations is provided in 16-page bulletin.

Consisting of transformer with primary and secondary switchgear, compact units permit voltage step-downs at load area. Arrangement eliminates need for long low-voltage cable runs, permits purchase of power at higher voltages and correspondingly lower rates.

Because of their completely packaged construction, substations are easy to order, require an absolute minimum of installation time and provide maximum safety for operating personnel.

Applicable for both indoor and outdoor use, they are available in ratings from 45 through 2500 kva with voltages through 14.4 kilovolts primary and through 600 volts secondary.

Units are ideal for such applications as schools, shopping centers, airports, hospitals, office buildings and hotels, and industrial plants.

(Bulletin 5604-1A is issued by I-T-E Circuit Breaker Co., Dept. P&PSE, 1900 Hamilton St., Philadelphia 30, Pa.)
Circle 9205 inside back cover.

Aluminum-coated wire

Six-page folder graphically presents steel core wires for ACSR, steel strand guy wire, overhead ground wire, tie wire, messenger wire, and telephone wire — all aluminized for corrosion resistance.

(Bulletin DH-537B is issued by American Chain & Cable Co., Inc., Dept. P&PSE, 929 Connecticut Ave., Bridgeport 2, Conn.)
Circle 9206 inside back cover.

Open transformers not so noisy

Low-sound, open dry-type transformers for industrial and commercial applications are described and pictured in eight-page bulletin.

Units are rated at 300 kva and above, 601 to 15,000v, and feature inorganic insulation to add to transformer life, light weight through aluminum conductors, and lower sound levels from advanced construction features.

Installation and maintenance information is outlined, and electrical and mechanical features are presented in chart form.

(Bulletin GEA-6668A is issued by General Electric Company, Dept P&PSE, One River Road, Schenectady 5, New York.)
Circle 9207 inside back cover.

Insulate inside line, cut costs

A patented internal insulation technique which cuts installation and insulation costs of lines and vessels carrying high temperature gases under pressure is described in fold-out bulletin.

By reducing the temperature to which the steel shell is subjected, normal wall thicknesses of inexpensive carbon steel piping can be used to carry gases having temperatures as high as 2000°F.

Illustrated with photographs, line drawings and graphs, the bulletin fully describes mechanical construction of the internal insulation.

(Insidline bulletin is available from Insidline Division, Baldwin-Hill Co., Dept. P&PSE, 500 Breunig Ave., Trenton, N.J.)
Circle 9208 inside back cover.

Chain drive lubrication

Principles of lubrication, maintenance, and oil selection for chain drives are discussed in 4-page bulletin.

Covering both roller and silent chain drives, the bulletin includes charts for classifying chain speeds and for proper oil selection.

(Bulletin 54 is available from Sun Oil Co., Industrial Products Dept., Dept. P&PSE, 1608 Walnut St., Philadelphia 3, Pennsylvania.)
Circle 9209 inside back cover.

Data card for pipe dimension, weight

Engineers and others involved in purchasing of pipe will be interested in 4-page technical data card. It contains the dimensions and weights per foot of pipe in sizes ⅛" through 36" for all schedules.

(Data Card TDC-191 is available from Babcock & Wilcox Co., Dept. P&PSE, 712 Eleventh St., Beaver Falls, Pennsylvania.)
Circle 9210 inside back cover.

Valves with Teflon seats, discs

Stainless steel valves with replaceable Teflon discs or seats are covered in bulletin. Complete line of valves for tough corrosive services is described, including globe, Y, check, needle and plug gate designs, as well as some with complete jacketing. Extensive data and application information is included.

(Bulletin #11 is issued by Alloy Steel Products Co., Inc., Dept. P&PSE, Linden, N.J.)
Circle 9211 inside back cover.

Electrical connectors in 48 pages

Complete line of plugs and receptacles in environment-resistant construction is illustrated and described in 48-page bulletin.

The environmental connectors are moisture-proof, shock-insulated, dust-tight, and corrosion-resistant. Circuit-breaking connectors have all the same features plus ability to break circuits under full rated load.

(Bulletin 2711 is issued by Crouse-Hinds Company, Dept. P&PSE, Syracuse 1, New York.)
Circle 9212 inside back cover.

Tells about liquid level, flow control applications

Much information is presented in 21 case studies describing a wide variety of jobs involving liquid level and flow control.

Typical applications range from water supply to proportioning systems; from stand-by pumps to unit ventilators; and from hydro-pneumatic tanks to water chillers.

Full engineering information is given for each job, complete with schematic drawings to show typical hookup. In many cases electrical wiring diagrams are also given.

(Bulletin ERS-A may be obtained from McDonnell & Miller, Inc., Dept. P&PSE, 3500 N. Spaulding Ave., Chicago 18, Ill.)
Circle 9213 inside back cover.

Flexible metal hose and rotary joints

Four-page bulletin covers line of flexible, seamless all-metal hose and fittings including a rotary joint for steam, water, oil, and air.

(Bulletin 955 issued by Seamlex Company, Inc., Dept. P&PSE, Long Island City 1, New York.)
Circle 9214 inside back cover.

Up-to-date technical data on horizontal turbine

Bulletin presents up-to-date data on horizontal steam turbines suitable for driving boiler feed pumps, stokers, forced and induced draft fans, condenser pumps, generators, and similar units that require continuity of service.

The units feature a solid steel rotor with semicircular buckets milled into the rim. Buckets are designed to eliminate end-thrust from the steam action and to exclude the effect of blade wear from the operational efficiency of the turbine.

Speeds range from 1000 to 5000 rpm with horsepower ratings of up to 200 and up to 400 for the two models.

(Bulletin 100-1-C is issued by the Whiton Machine Co., Dept. P&PSE, New London, Conn.)
Circle 9215 inside back cover.

Features engine-driven synchronous generators

Construction features of engine-driven synchronous generators are described in 6-page bulletin.

Field coils for most ratings of the synchronous generators are of wire-wound "Integrated" construction. This insulation system locks the coil structure securely and permanently to the pole, provides exceptional dimensional stability, strength and durability against centrifugal stress and vibration, and is unaffected by moisture, oil or chemicals.

Generators are available in all standard ratings, at speeds from 150 to 600 rpm, and with limitations due to rotor construction, from 720 to 1200 rpm.

Bulletin also carries information on self-contained, direct-connected generators and belted exciters for use with engine-type generators.

(Bulletin 05B6139B is published by Allis-Chalmers Mfg. Co., Dept. P&PSE, Milwaukee 1, Wis.)
Circle 9216 inside back cover.

Removes soot and ash from boiler tubes

Four-page bulletin describes shot cleaning system for removing soot and ash deposits from horizontal superheaters, economizers and reheaters as well as internal surfaces of tubular air heaters.

Steel shot is dropped over area to be cleaned and, as it bounces back and forth, removes deposits in small particles.

Illustrated bulletin discusses principle of operation and pictures equipment in action.

(Bulletin No. 2145 is issued by Diamond Power Specialty Corporation, Dept. P&PSE, Lancaster, Ohio.)
Circle 9217 inside back cover.

Lubrication and coolant systems

Lubrication and coolant systems for the steel, nonferrous metal and paper industries are fully described and illustrated in a new 8-page bulletin.

Component parts supplied by the company as well as convenient specification tables on oil reservoirs, pressure tanks, and unilube prefabricated lubrication systems are listed.

(Bulletin 1451 is available from Dravo Corp., Dept. P&PSE, Neville Island, Pittsburgh, Pa.)
Circle 9218 inside back cover.

Non-frosting liquid level gages

Detailed information on the special patented construction, other design features, and specifications for non-frosting gages are given in data sheet. The special construction guarantees that the vision slot will not frost over in gaging low temperature liquids.

(Data Unit #351 is issued by Jerguson Gage & Valve Co., Dept. P&PSE, 80 Adams St., Burlington, Mass.)
Circle 9219 inside back cover.

All kinds of tables and formulas

Booklet, entitled "Convenient Tables and Formulas", contains 120 pages of convenient tables, formulas and graphical symbols summarizing electrical data, properties of materials, heat transfer and steam information, measurements and other subjects.

(Booklet B-3677D is available from Westinghouse Electric Corporation, Dept. P&PSE, Box 2099, Pittsburgh 30, Pennsylvania.)
Circle 9220 inside back cover.

Describes all kinds air, vacuum pumps

The construction, dimensions, capacities, new performance curves, and installation for positive air and vacuum pumps, gas boosters and air motors are featured in a new 16-page bulletin.

The Bulletin includes 2 and 4 vane types; fan-cooled, water-cooled and new radiator air-cooled models; motor driven units; direct-coupled and belt driven models; integral pump and motor; automatically controlled tank units; plus full line of accessories.

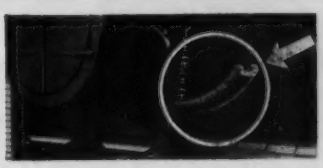
(Catalog 359 is available from Leiman Bros., Inc., Dept. P&PSE, 102 Christie St., Newark 5, N.J.)
Circle 9221 inside back cover.

Indicates smoke density and gives alarm

Consisting of light source, photoelectric receiver and indicator unit, instrument will show when smoke is above desired density or clear stack. Warning is visible or audible.

Five-page bulletin contains descriptive information and directions on use in addition to one schematic diagram and one detailed drawing.

(Bulletin E-103A is issued by Reliance Instrument Manufacturing Corp., Dept. P&PSE, 190 Glen Cove Ave., Glen Cove, L.I., New York.)
Circle 9222 inside back cover.



CHEAP ASSURANCE *against* SEAM FAILURE

It costs up to hundreds of dollars for a calking or patching job after the girth seam of a riveted HRT boiler has deteriorated. The price of a National Seam Protector for a 72-in. boiler is only $72.

Obviously, it is much more economical to protect the seam than repair it. What's more, a weakened seam might let go and cause expensive damage.

The girth seam of a riveted HRT boiler is vulnerable from the very nature of the case. Our literature tells why; also explains how the ceramic National Seam Protector is installed to insulate the seam. You're welcome to our literature, particularly if you operate one or more riveted HRT boilers.

NATIONAL BOILER PROTECTOR CO.
928 REIBOLD BLDG. • DAYTON 2, OHIO

Circle 9223 inside back cover.

LOOKING FOR VALVES?

- Read about the latest development in control valves.
- This story is in the New Developments section which starts on page 28.
- You'll find descriptions of many other types of plant and power services equipment there, too.

Talks about batteries

Modular storage batteries are subject of brochure, describing how various arrangements of one of three standard cell types — in specially designed dovetail base frames — can satisfy practically all industrial storage battery requirements.

(Brochure I-1 is issued by Scranton Cellomatic Battery Corporation, Dept. P&PSE, Archbald, Pa.)
Circle 9224 inside back cover.

High-voltage automatic circuit reclosers

Low-cost, high-speed automatic reclosing protection for 23- to 46-kv circuits is described in 12-page comprehensive technical bulletin.

It illustrates and describes in detail a line of reclosers — 23, 34.5 and 46 kv sizes with continuous-current ratings of 100, 140, 200, 280 and 400 amperes — for protecting subtransmission lines and higher voltage distribution lines.

Reclosers were developed for applications where more expensive fault-handling switchgear can not be justified and where power fuses are not sufficient because of their inability to restore service automatically after clearing transient faults.

Bulletin lists recommended applications, with a diagram of typical use on subtransmission circuits; gives specifications, including voltage, current and operating duty ratings; and provides extensive design and operating features, with circuit diagrams, cross sectional and schematic drawings. Also furnishes an analysis of performance testing with tables and photos, installation information with three diagrams, and ordering data.

Graphs which furnish time-current characteristics for each of the five recloser current ratings from 100 to 400 amperes are also included with each bulletin. Each graph shows both time-delay and instantaneous-trip operation characteristics.

(Bulletin G-1560 may be obtained from I-T-E Circuit Breaker Co., Dept. P&PSE, 1900 Hamilton St., Philadelphia 30, Pa.)
Circle 9225 inside back cover.

Dielectric set tests insulation

Instrument for making step-voltage-current (or resistance) tests, voltage withstand and breakdown tests on insulation is fully described in 4-page bulletin.

Available in two models, dielectric test set will test insulation of electrical equipment with voltage ratings in the 300, 600, and 2500 volt classes and higher.

Made in portable and bench models, instrument is convenient and economical tool for making acceptance and proof tests on insulating systems for quality control in manufacturing, after reconditioning and installation, and in preventive maintenance of installed equipment.

(Bulletin 22-5 is issued by James G. Biddle Co., Dept. P&PSE, 1316 Arch St., Philadelphia 7, Pa.)
Circle 9226 inside back cover.

Strainer data sheet

Two-page sheet describes line of single-basket strainers for medium and fine straining of industrial liquids at pressures up to 125 psig (cold). Strainers are stocked for quick delivery.

Available in sizes from 2 to 6 inches, strainers have bodies and covers of cast iron and stainless steel cylindrical baskets with ⅛-inch perforations standard.

Complete dimensional, size, capacity, and pressure drop data, plus useful viscosity correction factors are included.

(Bulletin 9S-A is issued by Dept. HT-1, Schutte and Koerting Company, Dept. P&PSE, Cornwells Heights, Bucks County, Pa.)
Circle 9227 inside back cover.

Case history on boiler feed water treatment

A full report, complete with photographs, describes control of treatment plant for boiler feed water at a western New York utility.

Problems faced by the utility and its method of solving them are detailed in the eight-page report.

(Performance Report W18.1-2 is available from Bailey Meter Company, Dept. P&PSE, 1050 Ivanhoe Road, Cleveland 10, Ohio.)
Circle 9228 inside back cover.

Push-button stations for corrosive areas

Corrosion-resistant, surface-mounted NEMA Type 4 and 5 push-button stations and pilot lights are described in two-page bulletin.

The units consist of molded phenolic enclosure case and cover, neoprene gasket and stainless steel hardware components.

They are available as a single unit with momentary contacts, two units with momentary contacts, two units with maintained contacts, two units with one momentary and one maintained contact, single unit with pilot light, and two units with pilot light.

(Bulletin 14B7814B is issued by Allis-Chalmers Manufacturing Company, Dept. P&PSE, Milwaukee 1, Wis.)
Circle 9229 inside back cover.

Specifies adjustable speed drives

Condensed specifications for line of adjustable speed drives is covered in 2-page bulletin.

Drives are available in three series ranging from 1/6 to 10 horsepower. Speed ranges are 100:1, regulation one to two per-cent on electronic models.

(Adjustable Speed Drive bulletin is issued by Cleveland Machine Controls, Inc., Dept. P&PSE, 1155 Brookpark Road, Cleveland 9, Ohio.)
Circle 9230 inside back cover.

Ring balance meter has many uses

Graphic discussion of ring balance meter applications is presented in eight-page bulletin.

Everthing from wide range flow meter; electronic receivers; computer for measurement of net weight of solids suspended in a fluid stream; and BTU measurement in a heat exchanger to measurement of weight flow of gas undergoing density variations is covered.

Also included are discussions of the ring balance meter with an integrator impulse generator for control of proportional chemical feed, and with special cams for measurement of flow with flumes and weirs, or measurement of high pressure steam flow by pipeline friction without an orifice.

(Bulletin MSP-160 is available from Controls Division, Hagan Chemicals & Controls, Inc., Dept. P&PSE, Box 1346, Pittsburgh 30, Pa.)
Circle 9231 inside back cover.

Quick couplings have rubber gaskets

Synthetic rubber gaskets are available with quick couplings for use wherever hose or pipe connections are disconnected periodically to save time and operating costs.

Gaskets are suitable for hard-to-handle chemicals and tough steam services. They are highly resistant to deterioration and retain their flexibility and long life under adverse conditions. Couplings with these gaskets are suitable for pressures to 200 psi and temperatures to 500°F. They are available from stock in ½″ to 6″ sizes in aluminum, bronze, monel, stainless steel and semi-steel.

Complete specifications, chemical recommendation charts, prices and features are contained in 8-page bulletin.

(Bulletin F-10-4 is published by OPW Jordan Co., Dept. P&PSE, 6013 Wiehe Road, Cincinnati 13, Ohio.)
Circle 9232 inside back cover.

REE 16-PAGE BOOKLET . . .
ith full details on applications, dvantages and specifications for ASTERPLATE iron-clad metal-c aggregate floors. Write for our free copy.

BEFORE YOU INSTALL OR REPAIR ANOTHER FLOOR...

. . . get all the facts now on MASTERPLATE — industry's toughest floor. Install the *right floor* now to save thousands of dollars in floor repairs and lower production costs.

The Master Builders Co., Cleveland 3, Ohio
Division of American-Marietta Co.

MASTER BUILDERS. MASTERPLATE*

*MASTERPLATE is a registered trademark of The Master Builders Co. for its specially prepared, metallic aggregate for producing "iron-clad" concrete floors.

Circle 9233 inside back cover.

YOU CAN EARN 20 DOLLARS

BY HAVING A NOMOGRAPH IN

Plant and Power Services Engineer

PLANT and POWER SERVICES ENGINEER is looking for good nomographs designed to simplify calculations necessary to efficient plant and power services. If you have such a nomograph that has been helpful to you in your work — and it has not been published before — send it to:

Data Editor
PLANT and POWER SERVICES ENGINEER
111 E. Delaware Place
Chicago 11, Illinois

CUT HERE AND FILE

Hydraulic horsepower of centrifugal pumps

W. D. STEVENS
Process Engineer
D-X Sunray Oil Company, Tulsa 2, Okla.

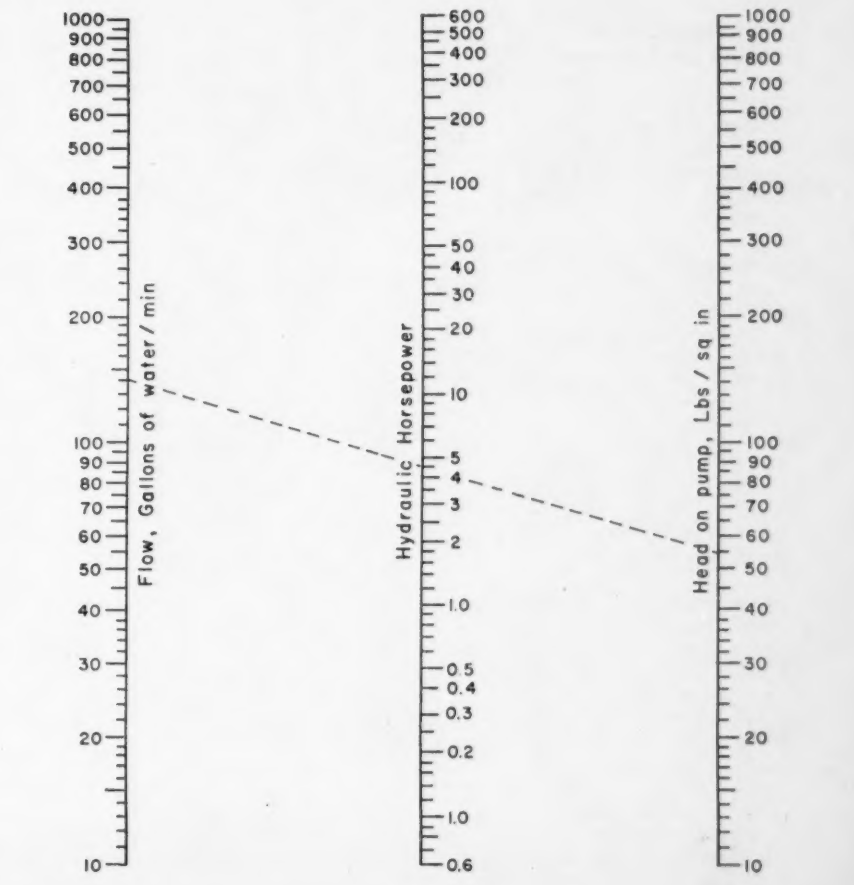
To find theoretical or hydraulic horsepower for centrifugal pumps at given rate of flow of water and a known head on the pump, multiply rate of flow in gal per min (gpm) by the pressure in pounds per square inch (psi) and divide the product by 1714.

The accompanying nomograph affords an easy method for finding hydraulic horsepower by this relationship.

Typical Example

What is hydraulic horsepower of centrifugal pump when water flow rate is 140 gpm and pressure is 55 psi?

Connect 140 on flow scale with 55 on head (pressure) scale with a straight line. Read hydraulic horsepower on central scale as 4.5.



July, 1959

Condensate filtration in technical paper

Reprint of technical paper given before the American Power Conference discusses reasons why filtration should be considered an integral part of the condensate salvaging system.

It shows that, based on laboratory and field studies, demineralizers in a scavenging system operate best on the removal of disolved solids. To protect the demineralizers, filters should be used to remove suspended solids.

Types of filtration equipment available for this service is also discussed.

(Technical reprint T-172 is issued by the Graver Water Conditioning Co., Dept. P&P-SE, 216 W. 14th St., New York 11, N. Y.)
Circle 9234 inside back cover.

Three-element feed water control system

Advantages, principle of operation, and typical diagrammatic drawings of 3-element feed water control systems appear in 8-page bulletin. Installation photographs are presented along with chart reproductions showing constant drum level under varying load conditions.

(Bulletin 530 is issued by Bailey Meter Co., Dept. P&PSE, 1050 Ivanhoe Road, Cleveland 10, Ohio.)
Circle 9235 inside back cover.

How to fight fires given in wall chart

Two-color wall chart explains the three classes of fires and the approved portable extinguishers to be used on each.

Measuring 18″ by 24″, the chart shows that wet extinguishing agents like water, anti-freeze or soda-ash are suitable only for Class A fires in ordinary combustibles.

It also discusses Class B and Class C fires which require an agent having a smothering extinguishing action. Foam and loaded streams approved for Class A and B fires are shown.

(Fire control wall chart is available from Walter Kidde & Company, Inc., Dept. P&PSE, Main St., Belleville, New Jersey.)
Circle 9236 inside back cover.

Shows rotary selector switch assemblies

Series of rotary selector switch assemblies are described in data sheet. Featuring a "cock-and-fire" actuating mechanism and non-tease circuitry, the assemblies are for use on electronic and computer panels, and other areas where mounting surface is at a premium.

They can be provided with 2 to 8 plastic enclosed single-pole double-throw basic switches. Innumerable switching sequences can be factory-adjusted to fit customer requirements.

(Data sheet 162 is issued by Micro Switch, Dept. P&PSE, Freeport, Ill.)
Circle 9237 inside back cover.

Describes dust collector

Complete product information about dust collector's application, design principle, construction, operation, installation and arrangements are presented in 20-page bulletin.

Ten illustrated pages describe hoppers, precleaners, aftercleaners, and arrangements for trickle valve, dust doors, rotary locks and dust gates.

Design for collecting moderate loadings of dry granular particles, collector combines the exhauster, dust separator and storage hopper in one compact unit, which can be relocated if the need arises.

(Bulletin No. 272-B is available from American Air Filter Co., Inc., Dept. P&PSE, 215 Central Ave., Louisville 8, Ky.)
Circle 9238 inside back cover.

Educational film on control valves

A new 16-mm colored film entitled "Muscles of Control" has a running time of 25 minutes.

Film shows for the first time, in simple pictorial style, how control valves function and how they are engineered. Various types of power actuators from pneumatic to electro-hydraulic are clearly demonstrated.

Special camera and animation techniques were used to reveal what happens inside the valve body under normal and extreme operating conditions.

Unique phenomena such as cavitation and turbulence are also clearly shown and explained, as well as the effects of corrosion and erosion on plugs and seats.

("Muscles of Control" film is available from Fisher Governor Co., Dept. P&PSE, Marshalltown, Ia.)
Circle 9239 inside back cover.

Welding connections to copper, steel

A sure-fire, low-cost method of welding electrical connections to copper and steel is outlined and illustrated in 4-page bulletin.

Applicable to splice, tap, and grounding connections with cable from #4 through 2000 mcm and to lugs, bus and flat surfaces, the process forms a solid copper fusion weld of higher conductivity than the cable itself and is impervious to moisture or corrosion.

Connections can be welded to metals including brass, bronze, copper, Copperweld, Everdure, galvanized steel, monel, nichrome steel, steel rail and structural steel. Welds are made with a lightweight completely portable mold requiring no external power source.

(Thermoweld bulletin is issued by Burndy Corp., Utility-Industrial Division, Dept. P&PSE, Norwalk, Conn.)
Circle 9240 inside back cover.

AC shaded pole small motors

Eight-page catalog describes four types of AC shaded pole, reversible, nongeared motors. Complete details on performance charatceristics, ratings construction, dimensions and typical applications are given.

Also featured is duty cycle data, power source considerations, special features, braking and speed control information.

(Bulletin R-1 is issued by Barber-Colman Co., Dept. P&PSE, 1115 Loomis St., Rockford, Ill.)
Circle 9241 inside back cover.

Outlines finned-tube heat exchangers

Advantages and performance characteristics of longitudinal finned-tube heat exchangers and thermal heaters are described in 12-page bulletin.

These exchangers offer high heat-transfer rate and fluid flow, together with interchangeability within a plant and "off-the-shelf" availability.

Cut-aways and exploded views of complete units and both regular and high-pressure closures are included.

(Bulletin FH-3-R is issued by ALCO Products, Inc., Dept. P&PSE, PO Box 1065, Schenectady, N.Y.)
Circle 9242 inside back cover.

Explains two kinds steam regulators

Illustrated two-page catalog sheet describes two differential-pressure regulators for steam service.

One unit controls atomizing steam pressure at an adjusted value higher than fuel oil pressure. The other controls atomizing steam pressure at adjusted value lower than fuel oil pressure.

(Section IV catalog sheet is available from Atlas Valve Company, Dept. P&PSE, 280 South Street, Newark 5, N.J.)
Circle 9243 inside back cover.

NEW LITERATURE

IS YOUR HEAT EXCHANGER LITERATURE FILE INCOMPLETE ?

A new bulletin on heat exchangers is being offered. You'll find a review of this bulletin in the NEW LITERATURE section, starting on page 38. This bulletin is just one of some 62 selected pieces of plant and power services literature reviewed in this issue.

CUT HERE AND FILE

Save Time, Money, Labor

find cracked parts quickly, easily, with

MAGNAFLUX Spotcheck®

DYE PENETRANT INSPECTION

NOW— Fire-Safe MATERIALS at same low prices

HERE'S WHY

Cracks, pores and defects open to the surface can cause rejects or failure in service. In parts or machinery this can mean costly repairs, prolonged downtime, extensive damage, even loss of life! Cracks can be eliminated thru inspection at any stage in manufacture, — or during maintenance overhaul.

HERE'S HOW

Inspect with easy-to-use Spotcheck. Dye penetrant inspection becomes as simple as pushing a button. All materials available in spray can and Fire-Safe— cleaner-dye remover, penetrant, developer. Defects are clearly defined as bright red marks against the white of the developer. Works on any solid material! Bulk materials also available, up to 55 gallon drums.

COMPLETE SK-3 KIT

only **$36.00**

U. S. A. only
F. O. B. our plant
Chicago, Illinois

Everything you need in handy, rugged steel carrying case. 2 spray cans Penetrant, 2 spray cans Developer, 4 spray cans Cleaner-Dye Remover, instruction book, cleaning cloth, wire brush. ORDER FROM YOUR DISTRIBUTOR, OR DIRECT!

MAGNAFLUX CORPORATION 7319 W. Ainslie Ave., Chicago 31, Ill.

☐ Please send me— SK-3 kits at $36.00 each, F.O.B. Magnaflux plant Chicago.
☐ Send FREE bulletin only. Includes low Spotcheck material prices in bulk.

Name _____ Title _____
Company _____
Address _____
City _____ Zone _____ State _____

Circle 9244 inside back cover.

Excess air nomograph for tar and oil combustion

NEIL M. DANIELS
Provo, Utah

This nomograph enables one to compute percentage of excess air for combustion of liquid fuels (tar and oil) when rates of consumption of each fuel and total amount of air supplied are known.

Although designed specifically for use in heating open hearth furnaces, it is offered for its own utility and as a guide to those who can adapt it to their own requirements.

Nomograph is designed to solve equation:

$$P = \frac{2.1 \times 10^6 A}{1550(800T + 900F)} - 100$$

where P = excess air, %
A = reading on air flow meter, %
T = reading on tar flow meter, %
F = reading on oil flow meter, %

In this instance, 100% on flow meter indicator for tar corresponds to 800 gph; 100% on oil flow meter corresponds to 900 gph; 100% on air flow meter corresponds to 2.1 million cu ft/hr.

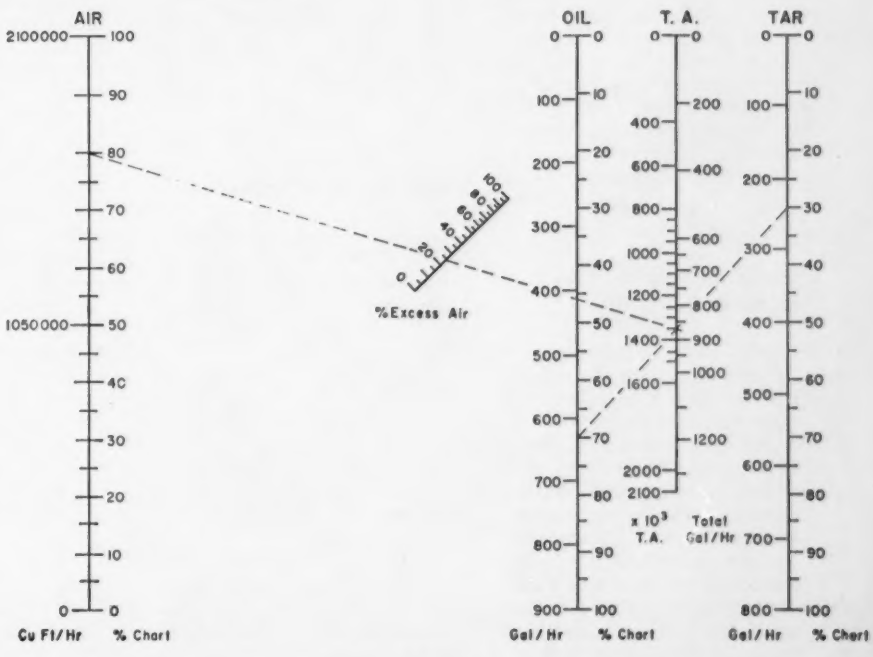
For theoretical and complete combustion, one gal of tar and one gal of oil require, respectively, 1553 and 1545 cu ft of air at entrance temperature and pressure. A reasonable average value is 1550 cu ft/gal.

Typical Example

For an open hearth furnace burning tar and oil under conditions described, what is percentage excess air when flow meter indicators for tar, oil, and air read 30, 70 and 80%, respectively?

Connect 30% on tar scale with 70% on oil scale and read rate of consumption of fuel and amount of air theoretically required on right and left sides of TA axis as 870 gal/hr and 1350 × 10^3 cu ft/hr, respectively.

Connect this point with 80 on air scale at left of chart and read percentage of excess air on slant scale as approximately 25.



Boiler level indicators give remote readings

Miniature, transistorized liquid level indicator has been developed to work in conjunction with main level indicator at the boiler. The secondary unit can be placed anywhere in the boiler room for remote observation.

The two-page bulletin describes where it is used, how it works, construction details, advantages, weight, dimensions, and gives installation diagram.

(Bulletin WG-1824, Supplement B, is available from Yarnall-Waring Company, Dept. P&PSE, 100 Mermaid Lane, Philadelphia 18, Pa.)
Circle 9245 inside back cover.

Offers sound strip film on plastic insulation

A sound, color strip film describes methods for insulating pipes in industrial installations with recently developed flexible foamed plastic.

The 35-mm film runs approximately 18 minutes and traces development of the insulation, describes its properties and shows a number of application techniques used in actual installations throughout the country.

("Insulating with Plastic" is available from Armstrong Cork Company, Dept. P&PSE, Lancaster, Pa.)
Circle 9246 inside back cover.

Discusses polyethylene as cable insulation

Detailed technical paper on "Flame Retardant Polyethylene for Wire and Cable" has been made available.

The paper contains about 3000 words, 10 tables and charts, a bibliography, and an appendix which gives specifications for black flame-retardant polyethylene jacket insulation for wire and cable.

(Bulletin RCT 710 is issued by Rome Cable Corporation, Dept. P&PSE, Rome, N.Y.)
Circle 9247 inside back cover.

Water-cooled compressors

Eight-page, two-color bulletin describes horizontal, water-cooled, single-stage, heavy-duty compressors.

Generously illustrated with line drawings, photographs, and cross-sectional views, the catalog shows details of component parts such as air cushion valve, sizes, capacities and ratings.

(Bulletin 350 is issued by Pennsylvania Pump & Compressor Co., Dept. P&PSE, Bushkill Blvd., Easton, Pa.)
Circle 9248 inside back cover.

Describes resistance temperature elements

Resistance elements for measurement of temperatures to 1200°F under pressures to 4500 psig are described and illustrated in 4-page specification folder.

Convenient selection chart and quotation-ordering information table are included, along with graphs showing limitations of protecting wells and leadwires.

(Product Specification E51-6 is issued by Bailey Meter Co., Dept. P&PSE, 1050 Ivanhoe Road, Cleveland 10, Ohio.)
Circle 9249 inside back cover.

Why two-pass boiler?

Why two-pass firetube packaged boilers offer fuel economy and low operating costs in all types of industrial plants and institutions is subject of four-page bulletin.

Comparing the features of two-pass oil- or gas-fired boilers with 3-pass and 4-pass designs, the bulletin analyzes heat transfer in boiler tubes.

Text is supplemented by 11 cross-section illustrations and three photographs.

(Bulletin BE-100 is issued by Boiler Engineering & Supply Co., Inc., Dept. P&PSE, 6 Manavon St., Phoenixville, Pennsylvania.)
Circle 9250 inside back cover.

Data on skived Teflon tapes

Specifications for skived tape of Teflon are given in data sheet. Nominal values for .005" thick tape of Teflon are stated to typify the product's characteristics as follows: di-electric strength, 2300 volts per mil; tensile strength, 4000 pounds per square inch; elongation 300 per-cent; nominal width tolerance: ±0.015" for .005" thick x ½" wide.

For reference, the data sheet includes a tabulation of specifications — thickness tolerance, width in inches, approximate pounds per square foot, approximate square footage per pound, and approximate length in yards per pad—for the range of nominal thicknesses from .001 to .062 inches.

(Data sheet on Teflon tape is issued by Chemo Products, Inc., Dept. P&PSE, West Warick, R.I.)
Circle 9251 inside back cover.

Gives data on vibration and noise control

Engineering specifications and performance data for 27 types of products for the control and measurement of machinery vibration, shock, and noise are given in 8-page booklet. Actual installation photos show a variety of types of equipment and tell how typical problems were solved.

Detailed discussion of the relative merits of steel springs and organic materials as isolation media is included. A special feature is the easy-to-read selector chart covering a wide range of equipment, showing recommended and alternate methods of isolation.

Chart also indicates when concrete foundations are necessary.

(Bulletin K4E is available from The Korfund Co., Inc., Dept. P&PSE, 48-15 32nd Place, Long Island City 1, New York.)
Circle 9252 inside back cover.

High-voltage starters

Complete line of high-voltage starters for use on 2200- to 4800-volt systems is described in 8-page bulletin.

Starters for squirrel cage, wound rotor, and synchronous motors, in both air-break and oil-break forms, are covered. Bulletin also describes the various enclosures available, including those for outdoor installations as well as for hazardous.

(Bulletin 8130 is issued by the Electric Controller & Mfg. Co., Division of Square D Co., Dept. P&PSE, 4500 Lee Road, Cleveland 28, Ohio.)
Circle 9253 inside back cover.

Adjustable sheaves

Adjustable sheave provides positive torque transmission, interlocking lug design, easy adjustment, simplified dismantling, and quick reassembly.

Offered in all popular pitch diameter sizes and a new "C" section size, the 7. 5/9/7, sheaves are made in 2, 3 and 4 grooves for use with A, B, or C section belts.

Descriptive leaflet includes a table of sheave dimensions.

(Bulletin 20B9125 is issued by Allis-Chalmers Mfg. Co., Dept. P&PSE, 1956 Thomas St., Milwaukee 1, Wis.)
Circle 9254 inside back cover.

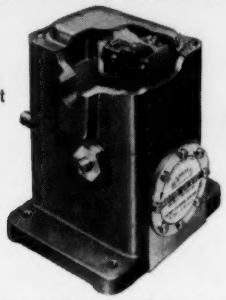
Combustion controls for package boilers

Compact, completely self-contained, electrically operated steam pressure regulator has been designed especially for automatic combustion control of package boilers.

Eight-page bulletin gives all details plus one schematic diagram and two detailed drawings.

(Bulletin E-102A is issued by Reliance Instrument Manufacturing Corp., Dept. P&PSE, 190 Glen Cove Ave., Glen Cove, L.I., New York.)
Circle 9255 inside back cover.

NEW
ROTO-GUARD
SHAFT MOTION INDICATOR



Connects to rotating shaft

Actuates warning lights or other signals. Operates control switches.

PROVIDES positive indication of drop in speed or stopping of machinery
PROTECTS conveyors • elevators • feeders • belt conveyors
OPERATING SPEEDS of 10 to 150 rpm make the ROTO-GUARD applicable to automatic protection of slow-moving machinery used in material handling and similar systems
RUGGED AND COMPACT: approx. 5" x 6" x 6".

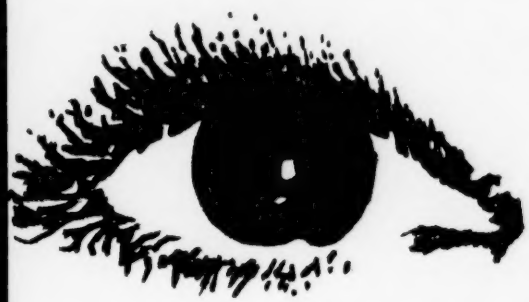
SIMPLE • POSITIVE • RELIABLE • LOW COST

A Development of
THE BIN-DICATOR COMPANY
13946-V2 Kercheval • Detroit 15, Michigan
Specialists in Automatic Control Devices for Material Handling Systems for Over 20 Years
TRADE MARK

Write for Bulletin RG-16

WE SELL DIRECT • PHONE ORDERS COLLECT

Circle 9256 inside back cover.



LOOKING FOR A NOISE METER?

Read about the latest development in noise meters. This story is in the NEW DEVELOPMENT section which starts on page 28. You'll find descriptions of many other types of plant and power services equipment there, too.

CUT HERE AND FILE

Plant Power Services Engineer

nomograph 29

Torque determination

B. B. KLIMA
Oak Ridge National Laboratory
Oak Ridge, Tenn.

When using dynamometers, it is convenient to be able to predict the expected torque at a given rpm using a given drive.

This nomograph, constructed by well-known methods[1], is convenient for accurate calculation of the formula[2]:

$$T = 5260\ P_H/N$$

where T = torque, lb-ft
P_H = horsepower of drive
N = speed, rpm

Typical Example

To find torque when using one-hp drive at rotational speed of 1000 rpm, connect 1 on P_H scale with 1000 on N scale.

Read torque of 5.3 lb-ft, or 7.0 oz-in, where line intersects T scale.

LITERATURE CITED:

1) DAVIS, D. S., "Empirical Equations and Nomography," Chap V, McGraw-Hill Book Co., New York, 1943

2) MARKS, LIONEL S., "Mechanical Engineers Handbook," p 1969, 5th ed, McGraw-Hill Book Co., Inc., New York, 1951

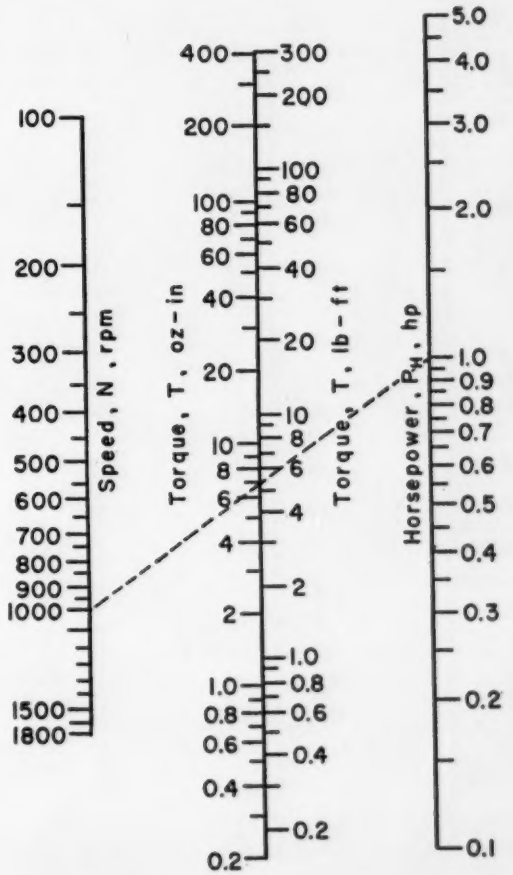
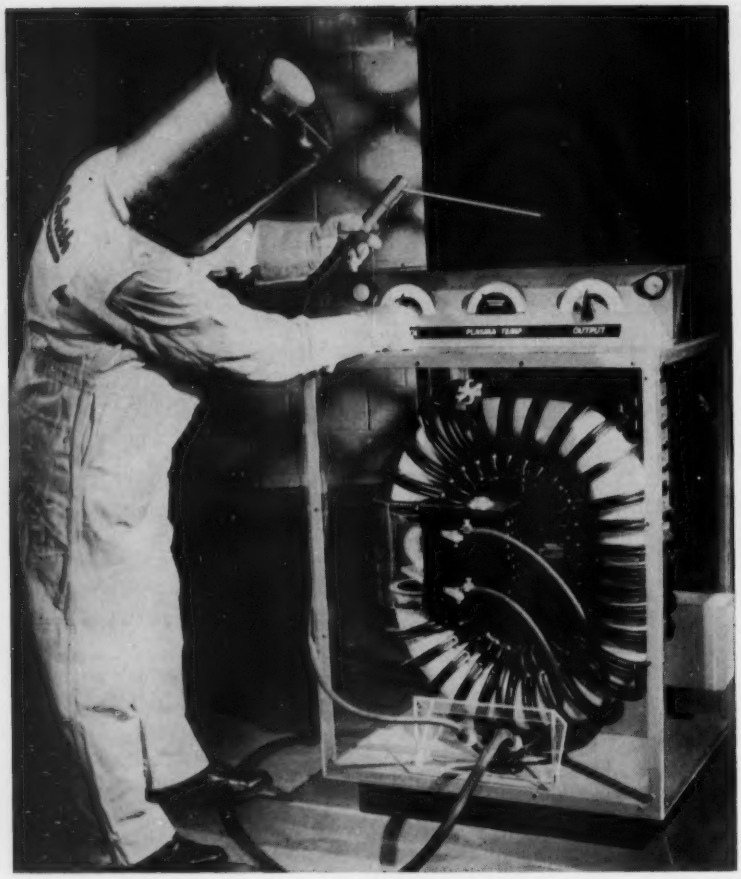
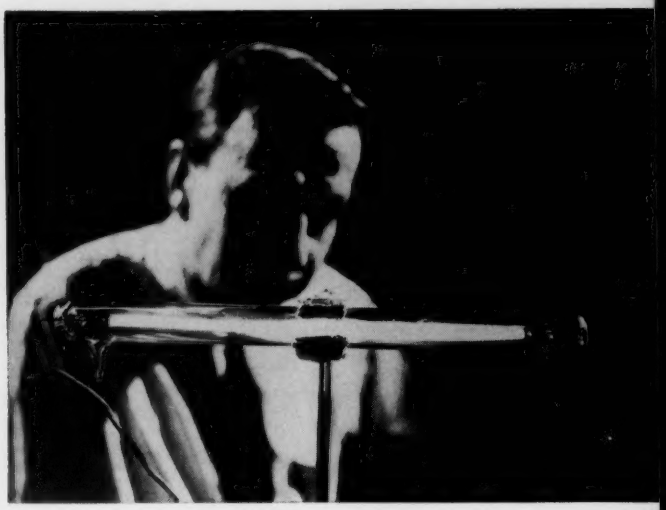


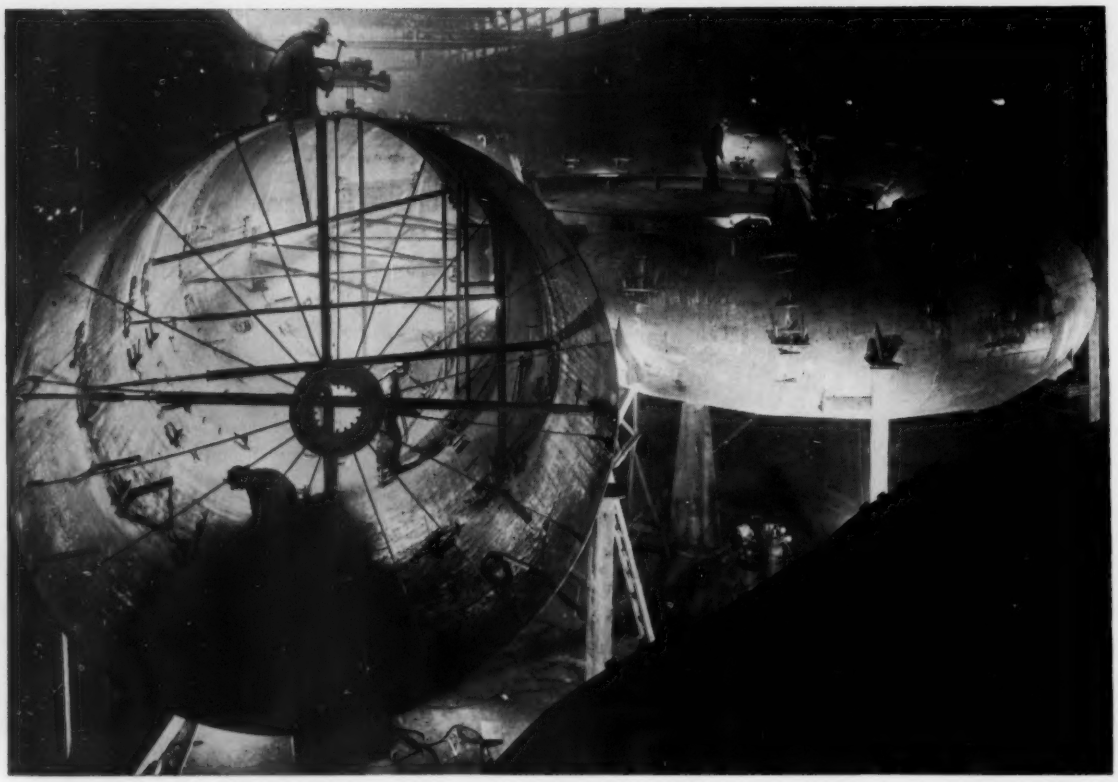
PHOTO NEWS



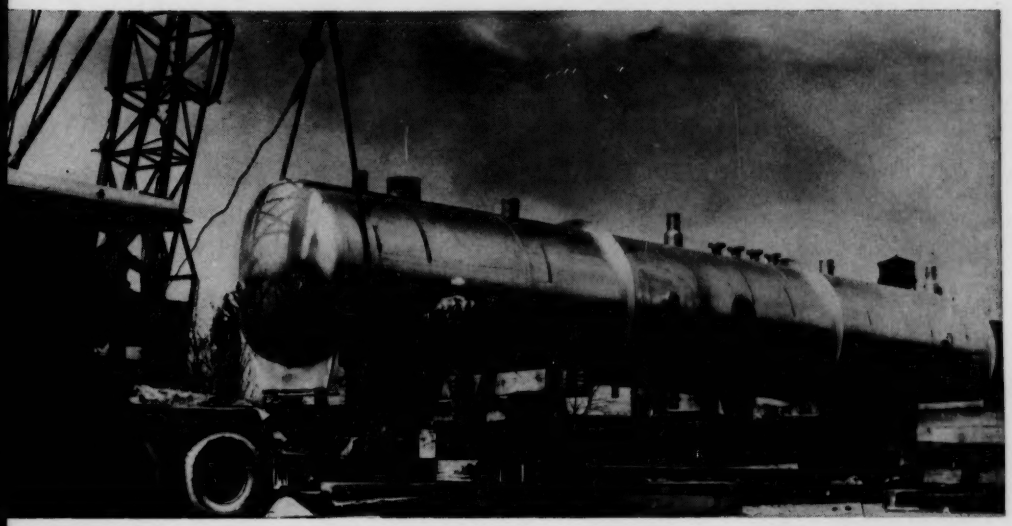
WELDING OF THE FUTURE was unveiled by the Welding Products Division, A. O. Smith Corporation, and the 1959 American Welding Society Exposition. This particular unit is the "Stellarweld", a spectacular power source for welding that conceivably could utilize fusion power. Using deuterium (heavy hydrogen) as fuel, this unit could supply an estimated 20,000 kw. The operator is wearing an air-conditioned helmet.



ELECTRICAL CONDUCTIVITY a
thermal stability at high temperatures
unusual graphite cloth developed
National Carbon Company, division
Union Carbide Corp., are demonstrat
in this evacuated glow tube. A narr
strip of the cloth approximately
inches long attains a white heat wh
operated on 100 volts. The incandesc
strip radiates about 1300 watts.



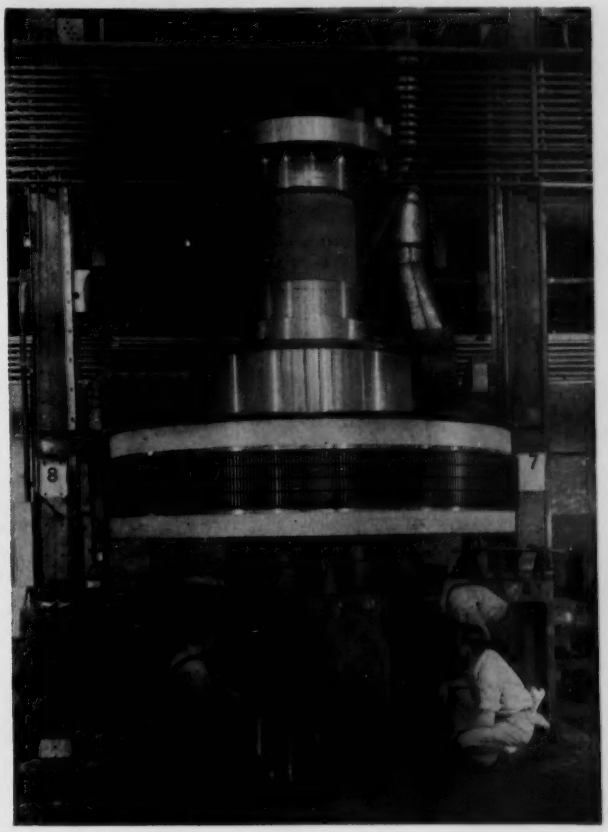
LARGEST SCROLL CASE for a reversib
pump-turbine in the US is under co
struction at Allis-Chalmers' West Al
Works. Having an 18-ft diameter in
and measuring 56 ft across, the case
destined for one of 12 reversible pum
turbines for the New York State Pow
Authority's Tuscarora plant.

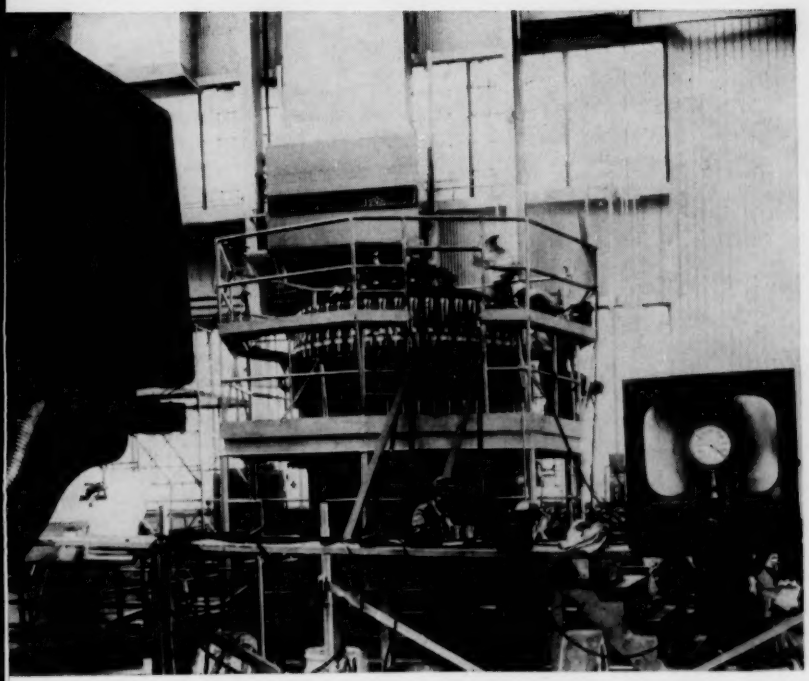


BELIEVED TO BE LONGEST ON RECORD, this evaporator was designed and built by The Griscom-Russell Company, Massillon, Ohio, for the first atom power plant in the New York area. The 65-ft, 87,000-lb evaporator will produce 65,000 lb per hr of vapor at a pressure of 62 psia. Impurities in the vapor will measure less than 250 ppb.

IN THE CONTROLLED THERMONUCLEAR POWER PROJECT, record size electrical components will be used to provide power for the "magnetic bottle." This 130-inch long shaft for a 4060-kw, 800v, 350-rpm generator is shown being lowered into its armature in an Allis-Chalmers shop.

WORLD'S LARGEST speed increaser for driving a 15,000-hp compressor in natural gas pipeline service has been built by Westinghouse. The unit is installed at the Egypt, Miss., compressor station of the Texas Eastern Transmission Corp. Lubrication to all bearings and gear mesh is provided by a forced-feed lubrication system which is cooled by two air-to-oil fan-type coolers.





ATOMIC FURNACE — a 105-ton steel vessel — for the N.S. Savannah undergoes a hydrostatic pressure test of 3000 psi at The Babcock & Wilcox Company's plant. The test was one of more than 2500 quality control inspections and trials conducted on the vessel during the 12 months of its manufacture.

Safety relief valves in 84 pages

Comprehensive catalog gives detailed information on full line of safety relief valves.

Valves ranging from ½" to 6" in size and made of bronze, semi-steel, or steel (either cast, forged, stainless, or alloy) are displayed and described. Valves for service ranges from 20 to 3000 psig and 300° to 750°F are available.

Thirty-one pages of extensive engineering charts and data, together with valve discharge capacity tables for liquids, air, gas, and steam are included in the 84-page catalog.

(Catalog 88 is issued by Marine & Industrial Products Co., Dept. P&PSE, North Wales, Pa.)
Circle 9257 inside back cover.

Discusses central station air conditioners

Two-color, 76-page catalog describes and illustrates line of low-pressure and high-pressure central station air conditioners.

The catalog covers design features, construction details, cooling and heating coils and accessories.

Tables are included to indicate fan capacities, coil air friction, selection factors, water coil data, coil capacities and physical data.

(Bulletin 9227 is issued by American-Standard, Industrial Division, Dept. P&PSE, Detroit 32, Mich.)
Circle 9258 inside back cover.

Timing belt drive

A timing belt drive constructed with steel cable cords imbedded in neoprene fully molded with nylon base fabric is described in four-page bulletin.

The bulletin points out how the timing belt drive is suitable for wide range of load applications — from subfractional to 600 hp with a torque load range from thousands of foot-pounds down to light loads in inch-ounces.

The drive makes possible a range of speeds from 0 to 16,000 ft per minute.

(Bulletin 20B8760 is issued by Allis-Chalmers Manufacturing Company, Dept. P&PSE, Milwaukee 1, Wis.)
Circle 9259 inside back cover.

Warns of electrical distribution trouble

Instantly warning of electrical distribution system trouble, three-phase monitor gives both visible and audible signals for unbalanced transformer loads, grounds, single phasing and loose connections.

Four-page bulletin contains both information and illustrations on instrument that can be wall-mounted or placed on a desk at any location.

(Bulletin C-5800 is issued by Principle Research and Development Corporation, Dept. P&PSE, 615 South Main St., Aberdeen, S.D.)
Circle 9260 inside back cover.

Covers complete line of AC and DC motors

Complete line of AC and DC standard motors, special motors, gearmotors, and adjustable speed drives is covered in 8-page bulletin.

Information is given on motors and drives for the machine tool, textile, aircraft, petroleum, chemical, paper and paper converting, air conditioning, materials handling and metal industries. Individual applications include irrigation, power plant, pump, mixer, agitator, pipeline, municipal, boiler feed pump and test equipment.

Bulletin summarizes characteristics and modifications for twenty basic types of motors and drives ranging from ¾ to 2000 horsepower.

(Bulletin No. 2650 is published by Louis Allis Co., Dept. P&PSE, 427 E. Stewart St., Milwaukee 1, Wisconsin.)
Circle 9261 inside back cover.

Welded fittings, flanges guide

Twelve-page booklet is a guide to material selection of carbon, alloy and stainless steel welding fittings and flanges.

Subjects include specifications and analyses, effects of alloying elements, mechanical properties and arc-welding procedures.

(Bulletin FB-78 is issued by The Tubular Products division of The Babcock & Wilcox Company, Dept. P&PSE, Beaver Falls, Pa.)
Circle 9262 inside back cover.

Phase sequence indicators

Line of panel-mounting phase sequence indicators is illustrated and described in 2-page catalog sheet.

Designed for integration in test stands and panel boards, the indicators permit rapid determination of the order in which the voltage peaks of a three-phase power supply occur.

Seven standard models are covered, and dimensioned outline drawings of the instruments are included.

(Bulletin 1551 is issued by Opad Electric Co., Dept. P&PSE, 43 Walker St., New York 13, N.Y.)
Circle 9263 inside back cover.

"Get on number 6 — She's sprung a leak!"

First in series on A1 conductor

Completion of the first portion of a long-range program to prepare a basic series of technical reference manuals for the electrical industry has been announced.

This initial project is a 20-page presentation of the latest available information on the current-temperature characteristics of both aluminum conductor, steel-reinforced, and standard aluminum conductor.

The booklet contains graphs showing current-temperature characteristics for the most-used sizes of these conductors. Formulas are provided to facilitate calculation for other sizes.

Several research reports are included.

("Current-Temperature Characteristics of Aluminum Conductors" is available from Aluminum Company of America, Dept. P&PSE, 774 Alcoa Building, Pittsburgh 19, Pa.)
Circle 9264 inside back cover.

Gives silicone grease data

Silicone grease designed as a rust inhibitor and lubricant for mated, threaded or nonthreaded ferrous components and fabricated rubber parts is covered in data sheet.

Compound maintains its consistency from −75°F to 300°F and is serviceable in many applications where other products would either solidify, or be subject to oxidation, evaporation or excessive bleed losses.

Applications include its use as a high and low temperature thread lubricant, corrosion preventive compound, and as a rubber lubricant for low and medium swelling components such as "O" rings.

(Data sheet SS-4007 is issued by Silicone Products Dept., General Electric Co., Dept. P&PSE, Waterford, New York.)
Circle 9265 inside back cover.

Titanium and Zirconium

Has 146 actual-size chain illustrations

This chain sample book illustrates most sizes of 17 types of welded and weldless chain. The actual-size illustrations help in selecting correct type and size of chain.

The 28-page bulletin also presents recommended uses and working load limits for each size. Trade sizes and trade numbers, material size, weight per 100 ft, number of links per ft, plus finish and packing information are given in an easy-to-read form.

(Bulletin 59 is available from S. G. Taylor Chain Co., Dept. P&PSE, 3 141st St., Hammond, Ind.)

Circle 9266 inside back cover.

Dissolves oil sludge

Four-page bulletin describes specially formulated liquid product that eliminates, by chemical means, many of the difficulties encountered in the use and handling of residual fuel oils.

The chemical disperses and removes sludge in tanks, suction lines, strainers, and other parts of the fuel oil systems. It also prevents new accumulations of sludge as well as improves atomization and combustion of the fuel.

(Bulletin 594 is issued by Betz Laboratories, Inc., Dept. P&PSE, Gillingham & Worth Sts., Philadelphia 24, Pa.)

Circle 9267 inside back cover.

Recording voltmeters and ammeters

Bulletin "Recording Voltmeters and Ammeters", describing one-, two-, and three-pen instruments in wall-mounting, panel-mounting, portable and pole-mounting models has been released.

Featured is a portable model for utility use with operating principles fully explained.

(Bulletin E-1111 is issued by the Bristol Co., Dept. P&PSE, Waterbury 20, Conn.)

Circle 9268 inside back cover.

Gives full details on motor brakes

Bulletin explains in detail the construction features of line of motor brakes, which are available in six sizes to cover the complete range of 600-series motors.

Also illustrates maintenance procedures, and contains selection charts for matching brakes to specific motors.

(Bulletin 5000 is published by The Electric Controller & Mfg. Co., Division of Square D Co., Dept. P&PSE, 4500 Lee Road, Cleveland 28, Ohio.)

Circle 9269 inside back cover.

Shows flow control for CO_2, argon, helium

Twelve-page catalog describes line of gas flow control equipment for argon, helium and carbon dioxide.

Operation and various applications for this equipment are described, and photographs of each type are shown.

Catalog covers recent additions to this equipment group — a series of fixed-pressure regulators with flow adapters. These regulators, single-stage and two-stage for cylinder use, when fitted with the proper flow adaptor, fix the gas flow rate at the desired level to avoid the waste of valuable gas. Flow adapters can be used for station outlet service.

Details on demand type proportioner for special gas mixtures for pipeline distribution systems are also given.

(Form ADC 888 is available from Air Reduction Sales Co., Dept. P&PSE, 150 East 42nd St., New York 17, N. Y.)

Circle 9270 inside back cover.

For more information on items reported in the New Literature section circle corresponding numbers on reader service card opposite back cover.

HTHW system

From page 21

der very high vacuum, water sprayed into an evaporating chamber is taken up by the concentrated lithium-bromide fluid.

Water remaining in the evaporator tank is cooled by this action producing a refrigeration effect, which chills 55°F water (brought in through a coil in the evaporation chamber) down to 45°F for circulation in a closed cycle to the central conditioning plant.

Water vapor, boiled off from the weak salt solution in the generator, is condensed by 85° water, pumped from a cooling tower located at grade level outside the boiler room. The water from the cooling tower is circulated at a rate of 1560 gpm.

Condenser water is also circulated through coils in the absorber to remove heat from refrigeration cycle.

The absorption machine's compact design requires two shells, supports, pump and control equipment. Control is by single start-stop push button — and, once started, is completely automatic.

Air Handling

Thirty-six thousand square feet of office space is completely air conditioned through ceiling diffusers — each room containing a thermostat for local control. A double-duct, high-velocity system transmits hot and cold air separately to blending boxes located above the hung ceiling.

Each box, containing a constant volume controller to maintain even air discharge velocity into conditioned spaces, assures a perfectly balanced system without variation in sound level.

Plant areas contain three principal zones. Packaging room (26,000 sq ft) where majority of women operators are situated is completely air conditioned. Directly above, in manufacturing areas, ventilation and heating are provided, but equipment is sized and piped to take cooling coils if 100% air conditioning becomes a future requirement.

In addition, manufacturing spaces are equipped with a series of roof-purge fans for rapid exhaust in case of product spillage. Warehouse and service areas (225,000 sq ft) are supplied with conventional heating and ventilating equipment.

Air distribution system for manufacturing areas is equipped with controllable-pitch propellers on supply fans for automatic adjustment on demand. Boiler room (within warehouse and service area) has supplementary exhaust fans for summer use.

(Absorption refrigeration machine is product of Carrier Corporation, Dept. P&PSE, Carrier Parkway, Syracuse 1, New York.)

Circle 9271 inside back cover.

Titanium & zirconium

From page 23

used for many years as a coating type getter in vacuum tubes because of its high melting point, low vapor pressure, low secondary electron emission, and the fact that it offers a large surface area for the absorption of gases, such

To next page

Classified Advertising

BOILER HOUSE FOREMAN

To supervise operation and maintenance of two (2) 450 H.P. B&W Boilers, 150 lb. pressure, Combustion Engineering Spreader Stokers.

Knowledge of water conditioning, automatic combustion controls and process heating systems.

Explosives and Chemical manufacturing plant in Southern Illinois, Salary range $6,000 to $6,700. Reply to:

PERSONNEL OFFICE
OLIN MATHIESON
CHEMICAL CORPORATION

Ordill Works
Marion, Illinois

Titanium and Zirconium

From preceding page

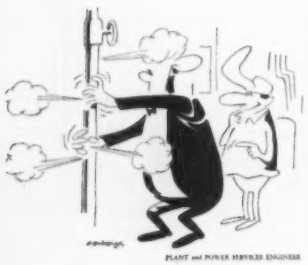
as hydrogen, nitrogen and oxygen. Zirconium metal does not function as well as powder as getter material but has been widely used for structural parts in vacuum tubes, such as grid and cathode supports, grid shields, plates, etc.

Other potential applications for zirconium are in electrolytic and point-contact rectifiers, condensers, x-ray filters, and arc lamps.

Cost

Most titanium mill products presently cost between $5 and $15 per pound, depending on quantity and size. Prices have been reduced more than 50% in the past three years and there is every indication that significantly lower titanium prices may be expected in the next few years.

Zirconium costs slightly more than titanium and is half again as heavy, so is not normally recommended for an application if titanium performs satisfactorily, but there are some applications for which high zirconium is clearly the best material. The continually decreasing prices for titanium and zirconium, as well as the fact that cost of a fabricated component or product often overshadows material cost, lead to the prediction that the electrical and electronic industries will soon be using millions of dollars worth of these new "space age" metals annually. ■



"No! I can't play any tunes on it . . . Now go find the corrosion engineer!"

advertisers' index

A

Armstrong Machine Works ..... 4th Cover

B

Bin-Dicator Company, The 45
Bird-Archer Company, The 8
Boiler Tube Company of America 7

C

Cobra Metal Hose 31
Coppus Engineering Corporation 3
Crane Co. ..... 2nd Cover

F

Federal Sign and Signal Corporation 27
Fly Ash Arrestor Corporation 6

G

General Coal Company 3
Graphic Systems 33

I

Ideal Industries 9
Irving Subway Grating Co., Inc. 13

M

Magnaflux Corporation 43
Mason-Neilan Division of Worthington Corporation 27
Master Builders Co., The, Division of American-Marietta Co. 41
Murphy & Co., Inc., Jas. A. 3

N

National Boiler Protector Co. 39
New York & New Jersey Lubricant Company 27
National Business Publications, Inc. ..... 3rd Cover

O

Onan & Sons Inc., D. W. 13

P

Penberthy Manufacturing Company, Division of Buffalo-Eclipse Corporation 11

R

Ruppright's Rotary Roof Cooler 33

S

Schaub Engineering Company, Fred H. 14
Setlow & Son, Inc., M. 31
Smith Corporation, A. O. 7

PLANT and POWER SERVICES ENGINEER

. . . which has developed from POWER INDUSTRY, INDUSTRIAL POWER and INDUSTRY POWER . . . serves the key men responsible for plant and power services throughout all industry, including utilities, and also in complexes of public institutions, schools, hospitals, etc.

The function of these plant and power services is to create and maintain the environment and provide the facilities necessary to effective operation of these industries and/or buildings, regardless of variety of products manufactured or uses of buildings.

The plant services include lighting, heating, ventilating, refrigeration, water supply and treatment and other conditions and material services needed for directed activity.

The power services include production, transmission and application of all forms of energy — steam, electrical, mechanical, pneumatic, hydraulic, atomic — and the engineering and maintenance necessary for its continuance in:

- **MANUFACTURING AND INDUSTRY**
  - Chemical and process industries
  - Electrical and industrial machinery
  - Food and kindred products
  - Central utility stations and engineering headquarters
  - Textile manufacture
  - Gas companies and pipelines
  - Lumber and wood products
  - Waterworks
  - Metal industries
  - Stone, clay and glass products
  - Atomic energy
  - Transportation equipment
- **PUBLIC SERVICES AND LARGE INSTITUTIONS**
  - Hospitals
  - Office buildings
  - Hotels
  - Schools and colleges
  - Marine
- **CONSULTANTS**
  - Consulting engineers
  - Industrial architects and contractors

Advertising Representatives

RICHARD H. PUTMAN — Sales Manager

CHICAGO 11, ILLINOIS, Richard H. Putman, Philip T. Clark, 111 East Delaware Place, WHitehall 4-6141

CLEVELAND 9, OHIO, Landon W. Myers, 5414 Archmere Ave., SHadyside 1-9452

LOS ANGELES 57, CALIFORNIA, Bob Wettstein & Associates, Jerry Holtz, 672 S. La Fayette Park Place, DUnkirk 8-2286

NEW YORK 17, NEW YORK, Fred S. Brandt, Eastern Sales Manager, William J. Prohovich, 369 Lexington Avenue, MUrray Hill 6-7738

PHILADELPHIA, PENNSYLVANIA, William J. Prohovich, District Manager

PORTLAND 5, OREGON, Bob Wettstein & Associates, 337 Pittock Block, 921 SW Washington St., CApitol 8-4107

SAN FRANCISCO 8, CALIFORNIA, Bob Wettstein & Associates, Jerry Nowell, Gene Watts, 355 Stockton St., YUkon 2-9537

SOUTHEASTERN STATES, Joe H. Howell, 40 Peachtree Place, N.W., Atlanta 9, Georgia, TRinity 2-2235

THAT'S INTERESTING

That's stretching it!

A new rubbery plastic material that snaps back like rubber yet, unlike rubber works without vulcanizing has been announced by B. F. Goodrich Company's Research Center, Brecksville, Ohio.

Known as "Estane VC", the product resists tearing and the effects of abrasion, solvents, oil and ozone. The most dramatic use of the material has been in the development of a plastic heart and heart valves.

It's toughness, flexibility, freedom from additives to leach out, stability in blood and plasma and acceptance by the tissues of the host make it useful not only for the heart structure but also for valves and artery grafts.

Other potential uses include: Fuel hose, small-bore tubing, belting, coated fabrics, sheeting for equipment liners, engine mounts, valve diaphragms, pump components, and insulators.

Keep cool

Guests at New York's Statler Hilton Hotel are kept in air-conditioned comfort by a miniature incline "railroad" with an electrically-driven tube cleaner as the "rolling stock."

Designed to save time and money and extract maximum efficiency from air conditioning and refrigeration equipment, the cleaner has a flexible shaft to permit use with tubes of varying OD.

At cleaning time the ramp is placed between the boiler room wall and the structure supporting the condensers. The man doing the cleaning simply pulls the cleaner up the rails as the flexible shaft progresses through each tube. When the shaft reaches the end of a tube, the cleaner will have reached the top of the ramp, the end of the "line."

What good is specialized business publication advertising?

Frank Kistenberger
Metallizing Engineering Co., Inc.

Sells industry

No one is in a better position to give a hard-boiled, practical answer to this question than the men who spend their working lives on the sales front . . . the men the ads are supposed to help . . . the men who sell.

Here is the statement of a salesman who knows what advertising does for him when it appears in the industrial, trade or professional publications that serve the specialized market to which he sells:

Says Mr. Kistenberger:

"I happen to know that better than 50% of my sales to new companies can be traced to leads from our business paper advertising. Another 25% of my sales to new owners I close after following up leads that can't be traced directly to our advertising, but I know darn well that that's where they come from because that's about the only place they could learn about our metallizing systems.

"It's been my experience that our trade advertising is getting to the right people. In many cases this man is an executive who is hard to see on a cold call. But he's a guy that will take the time and trouble to read and he's just the one to drum up interest in metallizing down the line in his company. In other words, you get more action if the suggestion comes down to the production department or the plant engineer from this executive. Of course, I don't mean to say that people will just read about a product like ours and instruct someone to write out an order. It's not that simple. But they do know about metallizing from our advertising and sometimes a surprising amount. That was particularly true of our new ceramic spraying equipment which was introduced last year and which got us into fields we'd never been in before. I think that getting a new product known is usually a pretty tough job but the leads our advertising got us were a big help in reaching the right people."

Why not ask your own salesmen what your company's business publication advertising does for them. If their answers are generally favorable you can be sure that your business publication advertising is really helping them sell. If too many answers are negative it could well pay you to review your advertising objectives – and to make sure the publications that carry your advertising are read by the men who must be sold.

PLANT and POWER SERVICES ENGINEER

NBP

One of the 207 members of
National Business Publications, Inc.
. . . each of which serves a specialized market in a specific industry, trade or profession.

This simple trap operating principle provides the efficiency, dependability and freedom from maintenance necessary for the most profitable use of steam

When trap is first installed, the inverted bucket is down and the valve is wide open.

When steam is turned on, condensate (solid color) flows into trap and out through discharge orifice, until —

Steam (light color) reaching the trap floats the inverted bucket and closes the valve.

When more condensate enters the trap, the bucket loses buoyancy and pulls on valve lever.

When weight of bucket times leverage overcomes pressure on valve, bucket sinks and opens trap.

Key: condensate steam steam bubbles air bubbles

ARMSTRONG INVERTED BUCKET STEAM TRAPS

are designed and made to give you these big benefits:

Amstrong Traps, the first inverted bucket steam traps, now represent the most advanced development of this time-proven principle. They provide all the advantages necessary for efficient, economical condensate drainage from virtually all types of steam using equipment.

1. *No steam loss* – Steam never reaches the orifice even when there is no condensate load.
2. *Automatic air elimination* – Vent in trap bucket passes air and other non-condensibles through to be discharged with condensate.
3. *No cooling leg required* – Condensate is discharged at steam temperature as fast as it reaches the trap because trap operates on difference in density between steam and water not on temperature.
4. *Operates on any back pressure* – Failure of one trap in system will not cause others to open because high back pressure does not affect an Armstrong trap other than to reduce capacity. As long as there is a pressure differential across the orifice the trap will close on steam and open for condensate.
5. *Unaffected by ordinary dirt* – Swirling action of condensate keeps dirt in suspension until discharged with condensate, prevents it from lodging in valve.
6. *Completely dependable* – Proved design plus the use of all stainless steel working parts assure continuity of service and length of service unmatched by any other trap.
7. *Big capacity in a small, economical package* – Armstrong design gives you the highest practical capacity for any given pressure. And remember, Armstrong capacity ratings are based on *hot* condensate at the *working pressure differential* stated, not on theoretical orifice capacities.

Further information on these advantages plus much additional information is given in the 48 page Armstrong Steam Trap Book. Ask your local Armstrong Representative or write direct.

860 Series for low pressure heating service.

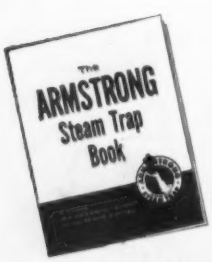
800 Series, side inlet, side outlet.

No. 801, side inlet, bottom outlet.

880 Series, integral strainer.

200 Series, bottom inlet, top outlet.

Forged Steel Series for high pressures, high temperatures.



The 48 page Armstrong Steam Trap Book tells how to correctly size, install and maintain steam traps for any pressure, any temperature, any load plus full catalog data on Armstrong Steam Traps. Ask for Catalog K.

ARMSTRONG MACHINE WORKS

8204 Maple Street • Three Rivers, Michigan

Circle 9272 inside back cover.

Plant Power Services Engineer

. . . published by . . .
Putman Publishing Company
CREATORS OF
READER ACTION
MAGAZINES
. . . featuring all these essential elements:

- TERSE VITAL EDITORIAL
- HAND-PICKED CIRCULATION
- "EXECUTIVE" FORMAT
- HIGH VISIBILITY
- QUALITY READERSHIP
- MORE READER ACTION